ELECTRICAL REVIEW

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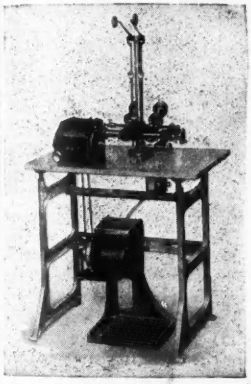

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER

ESTABLISHED 1872

Vol. CXLIII. No. 3708

17th DECEMBER, 1948

Air-Blast Switchgear

POSSIBLE FUTURE FOR 400-kV OPERATION

ON a number of occasions recently we have discussed developments arising out of the increasing amounts of power that have to be transmitted at very high voltages. Not the least of these relate to the interruption of heavy currents. Rupturing duties of circuit breakers connected to the 132-kV grid are now at many points more than twice the 1,500 MVA found adequate fifteen years ago, and 5,000 MVA will no doubt be required when the 275-kV reinforcement is realized. At the same time operating times have been reduced to mitigate the severity of short-circuit effects and also to secure system stability for which automatic high-speed reclosure has become a live issue.

British Pioneer Work

With the aim of meeting any conditions that may arise—abroad as well as in this country—British manufacturers during the past decade have followed up the pioneering work of the Electrical Research Association in the 'twenties by developing commercial ranges of high-voltage air-blast circuit breakers as an alternative to the long-established oil-immersed type. The design of these has called for more than the normal amount of engineering judgment in bringing out the usual compromise between electrical, mechanical and dimensional features necessary to produce results in a form that balances electrical performance (e.g., the use of a suitable number of breaks in series) against robust construction and ease of maintenance.

These points were clearly developed in the paper presented before the Institution of Electrical Engineers last week by Messrs. C. H. Flurscheim and E. L. L'Estrange. This paper was the latest of a series descriptive of the methods adopted in solving the multitudinous problems associated with the design of a breaker in which, unlike its oil-immersed competitor, the arc-extinguishing medium is supplied from an external source and is independent of the current interrupted.

Outdoor Installation

Different considerations have to be taken into account in dealing with the rate of rise of restriking voltage and performance is more sensitive to the natural frequency of the circuit.

Not the least of the problems concerns the provision of dry compressed air for arc extinction. In a C.I.G.R.E. paper last July Mr. J. McNeil was able to report completely reliable operation at the 132-kV outdoor substation at Barrow over two years, during which extremes of weather were encountered. This testimony appears to answer the doubts as to the suitability of this class of gear for open-air installations which have been expressed by some Continental advocates of its employment in enclosed buildings. Absence of oil in avoiding the risk of spread of fire and in facilitating maintenance (which is said to be less on account of smaller use of contacts) is then usually regarded as offsetting the higher first cost of the air-blast breaker.

Present indications are that at voltages

approaching 400 kV (which will be adopted in some countries within the next four years) the air-blast breaker will have the field to itself. For voltages up to the highest now in use (287 kV) experience in the United States demonstrates the unsoundness of any assumption that it will replace the oil breaker generally. Oil breakers have become established in Great Britain because of their long history of freedom from troubles that have beset their counterparts abroad. Their reputation has been enhanced by the results of tests at the A.S.T.A. high-voltage testing stations (unparalleled anywhere), so the determining factor here will presumably be based on straight economic comparisons only.

ELECTRICIANS' OUTPUT

When wages in the electrical contracting industry were raised and working hours reduced about a year ago it was an express condition of the new agreement that employers and operatives should do everything possible to increase output. Before the National Arbitration Tribunal in November the employers (the National Federated Electrical Association) contended that "individual production at the present time is lower than it was in 1938-39." The Tribunal itself (in awarding a penny an hour increase) remarked upon the absence of any production incentive scheme in the industry which, it said, appeared to be one for which such a scheme could be devised and it recommended that the parties should consider the possibility of such a scheme. We are not so sure of the amenability of the contracting industry to incentive schemes, but discussion might throw up possible arrangements.

DISTRICT HEATING IN LONDON

One section of the General Powers Bill deposited by the London County Council for introduction during the current session of Parliament relates to district heating schemes. Powers are sought to enable the Council and the councils of metropolitan boroughs to establish, in their capacity as housing authorities, undertakings for the supply of heat and hot water to houses including the erection of stations and other buildings; the provision, storage, transmission and distribution of hot water and steam and the "placing" of plant and apparatus. As an alternative the councils may obtain hot water or steam from "other persons." It is in this last clause that the British Electricity Authority will be interested. There is a persistent demand that new generating stations should serve the dual purpose of producing electricity and steam for heating. Conversely, if special district heating stations were erected the B.E.A. (as at Manchester) would be offered the "by-product" electricity.

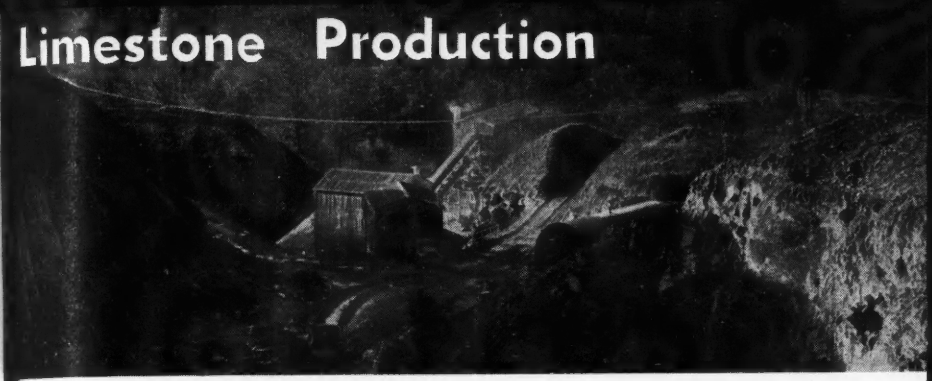
AB INITIO

In a circular letter to his staff and employees, Mr. C. T. Melling, the chairman of the Eastern Electricity Board, mentions that five of the new towns envisaged by the Ministry of Town and Country Planning will be in the Board's area. This will bring an accession of many thousands of new consumers—or consumers from other districts—and will mean much work for the Board's staff. But it will also provide a glorious opportunity of providing a proper layout designed with an eye on the future. Hitherto electricity supply systems have been superimposed upon existing towns and added to in a piecemeal fashion. Something like the arrangements projected by Mr. H. Midgley for the destroyed area of Plymouth are called for. This scheme was described by Mr. Midgley in the *Electrical Review* of 24th November, 1944.

BRUSH EXPANSION

The proposed merger of the two principal subsidiaries of Associated British Engineering, Ltd., with the Brush Electrical Engineering Co., Ltd., by the allotment of Brush shares to A.B.E., is a preliminary to the raising of £1½ million of new capital. To finance the large amount of work now in hand the group has had to have recourse to its bankers to the extent of £4 million. Orders on the books are said to have a total value of £15 million; they include Russian contracts involving £5 million. The need for further working capital is accentuated by the further orders from Russia for 50-kW diesel generating sets to the tune of £5½ million.

Limestone Production



ELECTRICAL APPLICATIONS TO QUARRYING AND PREPARATION

ONE of the important industrial developments we have been watching for some time is the increasing attention given to the winning of limestone and the preparation of this material for land fertilization, with the encouragement of the Ministry of Agriculture.

We have already shown what an important contribution the electrical industry is making to this development in our description of the electrical applications to the mining of limestone and subsequent operations at the workings of the Halkyn District United Mines, Ltd., in North Wales (*Electrical Review*, 23rd November, 1945). Our attention is now directed to another method of obtaining the material, i.e., quarrying, at the Parkmore Quarry, near Dufftown, Banffshire, of Parkmore Limes, Ltd.

Parkmore Quarry is known to be over one hundred years old, but only in the last few years, with modern methods of production and treatment, has its capacity been fully exploited, and recently we saw the workings as a fine example of flow-line production from the quarry face to disposal of the product by road and rail, the flow line embracing up-to-date electrically driven crushing, screening, grinding, conveying and delivery plant.

It is almost a dead-straight production line, too, and very compact, the total distance from the quarry face to the delivery points being something like 400 yd. The quarry is nested in the pleasant Banffshire hills about a mile north of Dufftown. The quarry face is about 120 ft high and, in its present roughly horseshoe formation, it is about 250 yards long. The rock is blasted away from the face, and in preparation for this charge-holes are bored 20 ft into the face both horizontally near the bottom and again vertically down from the top of a section to be dealt with in a particular operation.

For boring, 1¼ in "Climax" compressed-air operated rock drills are used. The source of supply for these drills is a two-stage air compressor which is automatically operated to maintain a pressure of 100 lb per sq in. in a

The horseshoe quarry face is about 120 ft high and 250 yd long

receiver. The compressor is driven by a 60 h.p. slip-ring motor from which there is belt transmission to the compressor shaft with a speed reduction from 960 r.p.m. to about 600 r.p.m. The rock is brought down from the face mostly in large lumps weighing up to half a ton each, and the larger lumps are subjected to secondary blasting near the face where they fall, so that pieces of up to about 18 in maximum dimension are obtained ready for loading by a Ruston diesel excavator into lorries for delivery to the primary crushing plant which is about 100 yards from the centre of the face or at the "mouth" of the horseshoe.

The lorries tip the rock into a Broadbent 30 in by 16 in jaw-type crusher which will deal with up to about 40 tons of rock per hour. The crusher motor is driven by a 60 h.p. 970 r.p.m. slip-ring motor, and there is a 7 to 1 ratio belt transmission scheme to the jaw shaft pulley. Although there is provision for stopping this motor in its near vicinity, it is normally operated from a central switch and control room to which we will refer later.

The primary crusher reduces the rock to pieces of about 4 in maximum dimension, and the material is passed directly on to an inclined-belt conveyor for delivery to either of two secondary crushers or granulators about 100 yards ahead in the flow line. The conveyor is driven at its delivery end by a 3 h.p. 960 r.p.m. squirrel-cage motor which is coupled to a "Radicon" reducing gear with a final speed of about 24 r.p.m. at which there is direct transmission to the head drum of the belt. This motor is also remotely operated, but in this case there is provision locally for both starting and stopping.

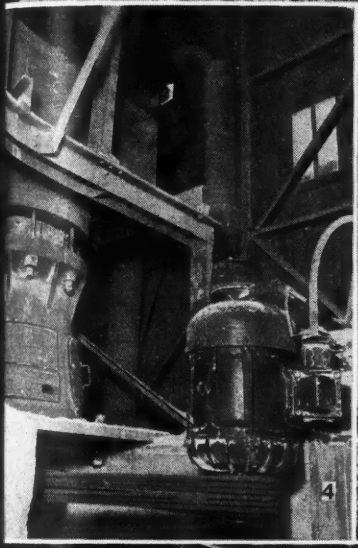
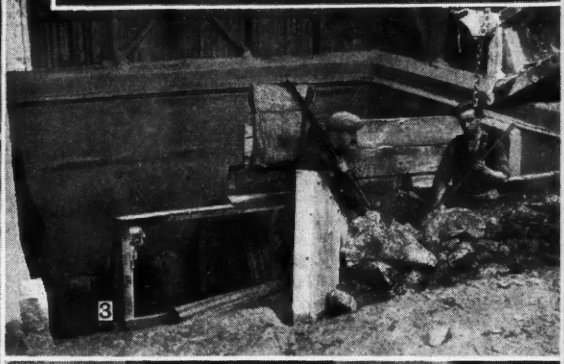
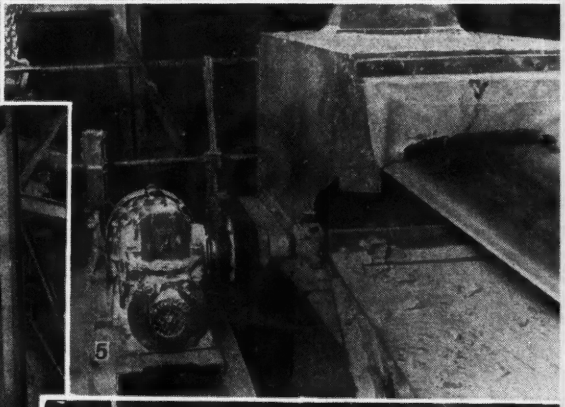
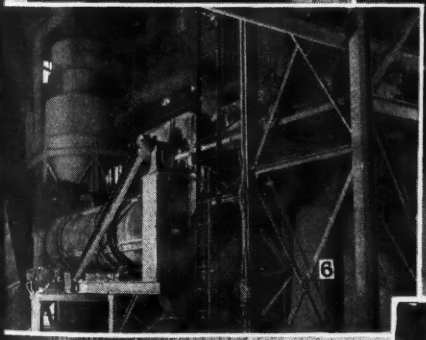
The secondary crushers reduce the material to dust, grit, $\frac{3}{8}$ in, $\frac{1}{4}$ in and $\frac{3}{4}$ in sizes, and rejects are returned by another belt conveyor to the primary crushing plant. The secondary crushers are of the gyratory or cone type, and each is driven by a 45 h.p., 1,460 r.p.m. slip-ring motor which has a rather unusual mounting, i.e., vertically on its normal slide rails on the side of a projection of the crusher concrete foundation block, with the slip rings at the top and the transmission pulley at the bottom. The multiple V-belt transmission scheme directly on to the vertical cone shaft of the crusher has a ratio of about 3 to 1. These secondary crusher motors have local provision for stopping only, and they are also normally operated from the central control room to which we have referred and which is adjacent to, or part of, the secondary-crushing house.

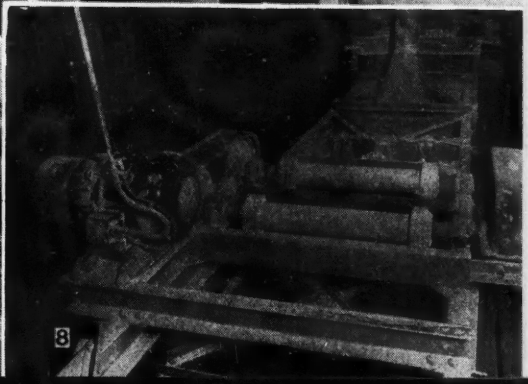
Thus all the forward plant are motors controlled from this room which is supplied with electricity from a main combined substation, switch and control room and compressor house. The switchgear is mounted on two separate boards, one with Ellison oil circuit breakers for the s.r. (larger) motors, the breaker in each case being associated with a floor-mounted drum-type rotor resistance unit, while on the other board there are Mavor & Coulson air-break contactor starters for the s.c. (smaller) motors. On the first-mentioned board there is mounted a 300A incoming circuit breaker.

In addition to the air-break starters for the s.c. motors referred to there are starters for other motors such as those for driving dust-extraction fans associated with the primary and secondary crushers and the screen house, and for the rejects conveyor from the secondary crushers and the conveyor to the screen house. On this same board there are also two Ellison oil circuit breakers, one for the screen house plant and one for the lighting system, as well as a sub-distribution board for lighting and small power. In this switch and control room there is also a 440V/110V lighting transformer.

The driving scheme for the conveyor to the screen house is similar to that for the conveyor from the primary to the secondary crushing plants. In the screen house the material is dressed into various sizes and is available at this stage as pro-

See opposite page—(1) In preparation for blasting, the face is bored by 1½ in compressed-air-operated drilling machines. (2) and (5) The material from the primary crusher is taken forward to the secondary crusher by a 3 h.p. motor driven inclined conveyor. (3) The 40 tons per hour primary crusher has a 60 h.p. drive. (4) Each of the secondary crushers is served by an unusual vertically mounted 45 h.p. motor. (6) The rotary drier has a 20 h.p. drive which also serves the dust extractor and burner fans; note elevator left and cyclone rear. (7) Most of the motors on the forward plant are remotely operated from a secondary switch and control room. (8) The 7½ h.p. motor driven oscillating screen produces five sizes of material

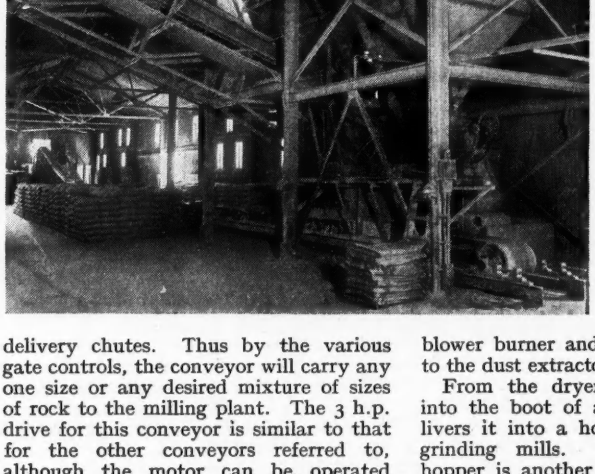


ducts for road surfacing, although most of it is passed on to the mill house for grinding ready for land fertilization. The "Clarmac" oscillating screen consists of a trough-like structure about 30 ft long with a perforated and stepped bottom, so that fines are passed through the screen at the feeding end. The screen is driven by a 7½ h.p., 960 r.p.m. s.c. motor, the normal direct-on starting and stopping for which is effected locally, and it will be remembered that there is a supply switch for this in the secondary control room. This motor surmounts the screen structure at about the middle of the latter, and there is an even-ratio belt transmission scheme to a central shaft which traverses the screen body.

From this central shaft on the opposite side to the motor there are gear transmissions to two agitating shafts with eccentrics which communicate by levers or crankshafts on to the spring-mounted body of the screen. There are five different sizes of riddles in the screen, and in each case the material passes down a chute with gate control on to a belt conveyor which is common to all five of the delivery chutes. Thus by the various gate controls, the conveyor will carry any one size or any desired mixture of sizes of rock to the milling plant. The 3 h.p. drive for this conveyor is similar to that for the other conveyors referred to, although the motor can be operated either from a point near itself, i.e., at the conveyor head in the mill house, or from the platform alongside the delivery chutes from the screens. The motor is not remotely operated from the central control room. There is a similarly driven conveyor for the return of rejects from the screen to the secondary crushers.

In the mill house about another 50 yards along the production line is a hopper which is fed from the conveyor last mentioned, and from this hopper a short feed belt conveyor delivers the material into a horizontal revolving dryer about 40 ft long and 10 ft in diameter. This is fired by a diesel oil burner and the material passes through the dryer counter to the flame while it is tumbled inside by the revolving drum. The dryer itself, a blower for the oil burner and a fan which extracts dust and passes it on to a cyclone are all group driven by a 20 h.p., 1,440 r.p.m. s.r. motor mounted on the girder supporting structure for the dryer, i.e., at about the lower level of the revolving shell.

At the end of a directly driven shaft and on the opposite side of the dryer to the motor is coupled a "Radicon" reducing gear on the final shaft of which is a pinion which engages a rack round the outside of the shell, so that this revolves at a few turns per minute. From the shaft on either side of the dryer there is a roughly even-ratio belt transmission, in one case up to the blower burner and in the other case up to the dust extractor.



The dual-bagging machine handles about 8 cwts of limestone per minute

From the dryer the material passes into the boot of an elevator which delivers it into a hopper above a pair of grinding mills. Associated with this hopper is another motor-driven extraction fan which delivers the dust into another cyclone. From the hopper each of

two chutes delivers the rock on to the separately motor-driven rotary feeding table serving one of the two Bradley grinding machines or pulverizers which reduce the material to a fineness of 50 per cent passing through 100 mesh. Each grinding mill, which will deal with about 11 tons of rock per hour, is driven by a 100 h.p., 970 r.p.m. s.r. motor, transmission being by belt on to the mill shaft, with a 3-to-1 ratio speed reduction. In a covered trough under the two grinding mills is a screw conveyor common to both mills which delivers the ground material to another elevator serving another hopper via an overhead screw conveyor. This second hopper serves a dual-bagging machine which fills at the rate of about 8 cwt per minute and is served by a 15 h.p. motor which actually drives a blade feeder which forces the ground lime into the bags. The filled bags are placed on a long belt conveyor by which they are delivered to railway wagons at the end of the building.

Each of the grinding mills has a 100 h.p. drive (one motor only shown) and a separately driven table feeder

The feeding screw for the hopper above the bagging machine can be adjusted to divert the product into a bulk hopper which delivers the product on to another belt conveyor and, in turn, to an elevated hopper outside the building for direct delivery of the product into special wagons which transport the material to the land where it is required and also distribute the fertilizer over the land by means of a rotating spreader at the back of each wagon. Alternatively, there are two other screw conveyors which serve railway wagons with the loose material on the other side of the building.

All the motors in the mill house are remotely operated from the main switch room already referred to briefly and from which the supply is taken to the secondary control room for the forward part of the plant. This main switch and control room is also the main works substation in that, in a screened-off section, there is an incoming 11kV feeder from the system of the North of Scotland Hydro Electric Board, from which is supplied a 500kVA 11kV/440V transformer. The supply link connecting the two switch and control houses is on the 440V side.

The air compressor for the boring machines at the quarry face is also housed in this room. The general layout of switch and control gear in this main switch room is similar to that in the secondary switch and control room. Ellison oil circuit breakers on a central board, associated with floor-mounted rotor resistance drum-type starters, serve the larger motors, while two wings to this board accommodate in the main the direct on air-break M. & C. contactors for the smaller motors.

On the central board, in association with the control equipments for the two 100 h.p. mill motors, are two Brookhirst equipments which automatically switch either of these motors both "on" and "off," according to the load on the motor. Thus the rate of production is automatically controlled.

All the motors throughout the installation were supplied by Brook Motors, Ltd., and in view of the very dusty conditions under which they work they are all of the totally enclosed surface-cooled type. The electrical equipment was installed by Edmiston Brown & Co., Ltd.

We are indebted to Parkmore Limes, Ltd., for permission to visit the workings and to Mr. S. Smith, works manager, and his staff for their assistance.

Views on the News

By REFLECTOR

A FEW weeks ago I commented on the reticence of the British Broadcasting Corporation in the matter of an order for forty electric locomotives for South Africa. While the name of the locomotive makers was mentioned, that of the General Electric Co., which was to provide the electrical equipment representing half the value of the contract, was kept dark. The same thing happened again last Sunday when the news bulletins included a report of an order worth £5½ millions for diesel generating sets for Russia. While I shudder to think what would happen if commercial matters were too freely dealt with by the B.B.C., I consider that these very large export contracts merit special consideration and credit should be given to the companies responsible for securing them.

★ ★ ★

In its latest weekly statement of output the Ministry of Fuel and Power, I am told, gives the quantity of electricity sent out as "million cubic feet." Is this a new move for the unification of the two industries now that gas is to be nationalized as well? Or perhaps the problem of electricity storage has been solved at last? Transmission losses also seem to have been effectively dealt with, for the figures given for electricity sent out so far this year are the same as those cited in the accompanying summary as "electricity consumed."

★ ★ ★

Although the financial or economic welfare of its members is outside the scope of the I.E.E.'s charter, as was implied in last week's *Electrical Review* leader, many feel that it should not be totally indifferent to this aspect. It would not be in consonance with the dignity of the profession to set up a parallel body to look after the members' material interests and indeed the various branches and grades are so numerous that a general association of this kind would not be workable. The same consideration applies with even greater force to organizations which set out to cover the whole engineering profession, electrical and otherwise. Many Institution members already belong to associations which are actually trade unions even if they are not always so labelled, but many more are unattached. If the Institution itself may not indulge in this kind of activity it is possible that it could use a good deal of unofficial influence to secure reasonable conditions of employment. At all events the senior members who are often the employers of the less-senior ones can, and no doubt do, ensure that technical qualifications are adequately recompensed.

★ ★ ★

It is not yet a crime to give electrical presents at Christmas, however great the need to keep people off the peak, and so I hope that this good custom will continue. A splendid reminder of the variety and excellence of electrical gifts has been put out by a well-known Manchester firm of electrical engineers and contractors. It takes the form of a well-illustrated brochure in which colour is tastefully used and there is a minimum of "sales talk." The suggestions cover everything from a car heater to a large refrigerator.

★ ★ ★

The accepted theory of the origin of the a.c. wave sign has been badly shaken by the Hopkinson Electric Co., Ltd., which claims to have found the real origin of the sign—it formed the pattern of a tie worn by John Langdon Davies, inventor of the single-phase induction motor and founder of the Langdon-Davies Motor Co., the forerunner of the Hopkinson Co.! This momentous discovery is revealed in a humorous greeting card issued by the company, which, in addition to a picture of the famous tie, also illustrates some other "startling theories" of the origin of the sign.

★ ★ ★

According to a Berlin correspondent of the *Manchester Guardian*:—

> "Berlin now has its first post-war prophet and political mystic, Herr Jakob Kuny. His teachings of the lovestream of the spirit embrace such matters as cooking and magnetism."

Air-Blast Breakers

DESIGN AND PERFORMANCE

SOME of the factors which influence the design of air-blast circuit breakers in the 1,500 to 5,000 MVA, 110 to 264 kV, range are commented on in a paper prepared by Messrs. C. H. FLURSCHEIM and E. L. L'ESTRANGE (Metropolitan-Vickers Electrical Co., Ltd.) for the Supply Section of the Institution of Electrical Engineers.

The paper first describes methods of achieving economy in compressed air consumption and then considers the limitations as well as advantages of multi-break interruption and the design limits of shunts for voltage control. There follows a graphical indication of the performance of a double-break 3,500-MVA, 132-kV switch employing parallel air flow and non-linear resistor shunting, two or four interruptors per phase being in parallel aerodynamically and in series electrically.

The authors' conclusions are that both construction and maintenance can be simplified by employing the least number of series breaks that is consistent with short contact travel and providing independent access to each unit; by avoiding air economy devices, or methods of automatic reclosing, which increase mechanical complication by needing more moving parts; and by using porcelain insulation exclusively with the minimum of exposed internal surfaces which it is necessary to clean.

In preference to capacitor and linear resistor shunting, the authors show that non-linear resistors are a positive means of controlling voltage and do damp over-voltage associated with the switching of small inductive currents. They also reduce the probability and extent of over-voltage when switching capacitive currents, while the shunt current can be broken by the sequential isolator without additional interruptors.

Methods of short-circuit testing are examined to confirm the authors' belief that, with certain reservations, unit testing can be an effective method for extrapolation beyond the range of available test plant.

Discussion

DR. F. C. WINFIELD (Merz & McClellan), who opened the discussion on the paper, thought that air-blast circuit breakers were ousting oil circuit breakers. In the battle between the resistors and the non-resistors, the latter appeared to be retreating slowly and beginning to use the weapons of their enemies. Yet another battle was now developing, between the linear and the non-linear resistances. He would be sorry to see the linear resistances give in too easily because, practically speaking, they had greater technical purity. The non-linear resistances did not touch the range in the rising period, whereas the linear resistances took it right from the start, reducing the rate of rise and carrying on throughout the strike. The linear resistance was, in fact, very much a system modulator. When final extinction was reached, the non-linear resistance was of high value, whereas the linear type finished up with a considerable current which could not be broken on the isolator. The applications of the linear resistor that had been advanced so far had not tackled that problem.

DR. W. B. WHITNEY (E.R.A.) considered the divided gas tube with parallel air-flow preferable to the air-flow running along a tube with multi-breaks. With regard to system restriking rates, the results obtained on the Swedish and British networks were very similar. Referring to the test plant restriking voltage for 132-kV breakers, he said the authors gave the impression that the effort of the breaker, as measured by pressure, might be considered to be much greater on the test plant, or at 55-kV, than on the 132-kV circuit, although the test work was done at 33-kV, which was presumably equivalent to 66-kV because there were two breaks in the circuit. He doubted whether the authors meant to imply that, because the network was at 132-kV whereas the test plant worked at 33-kV and, although the r.r.r.v. was very much higher, it did not follow that the ratio was anything like one to four.

Forced Blast for Higher Voltages

MR. D. F. AMER (Reyrolle & Co.) agreed completely with the authors' conception that forced blast principles were essential for the higher voltages. Regarding the

balanced aerodynamic system with two valves which they had used to give correct pressures at the nozzles, he was not sure that similar pressure at the nozzles was necessary, but did not like the idea of two valves. More interesting was the arrangement from the point of view of electrical balance on the centre point of the circuit breaker. That was virtually the isolator position which was connected to two of the three nozzles. The nozzles might have a high leakage value. With that particular positioning it would be essential to fit resistances, but the real problem was at what stage of development they should be fitted. The difficulty could be overcome by putting the breakers in a single stack. Electrostatic balance could be obtained by the use of two condensers of 300 $\mu\mu$F. It was therefore not essential to fit resistances for this particular purpose. In recent researches he had found that it was better to rely on the natural selection of breaks, of the voltage apportioned to each break, rather than to force selection by the use of heavy capacitances or resistors. It would appear that in that respect the resistor would be put right across the breaker, in the near future, and not necessarily across the individual units. Tests with resistance glaze had been moderately successful. Porcelain was, he thought, rather a "chancy" material mechanically.

Restriking Voltage

MR. H. F. MAASS (Ferguson, Pailin, Ltd.) said the authors' remarks on restriking, particularly on unit testing in relation to r.r.r.v severity, had considerable bearing on the economics of air-blast breaker design for the very highest voltages when several breaks in series were used. The matter was one of considerable urgency in his opinion. Tests made in this connection had shown that reducing the rate of rise of restriking voltage did not invariably result in an easement of the breaker performance when it was operated near its voltage limit. This was particularly important with relatively small currents. In the tests carried out, the peak restriking voltage obtained with the rate of rise reduced by shunt condensers was much higher than for the higher frequency curve, 170-kV as against 135-kV. The transient extended over a much longer time at the lower than at the higher frequency, first because the ohmic resistance at the lower frequency was much less and, secondly, because some current forcing took place. He stressed the advantages gained by reducing the test rate of rise at the highest currents, since about 50 per cent greater nozzle cross sections of air pressures and correspondingly increased air consumption would have to be used for the full rate of rise of the test plant.

MR. P. E. HAMMARLUND (Asea Electric, Ltd.) said the authors had come to much the same conclusions about network and design factors as had been reached in Sweden, but there were several points of disagreement. He agreed that pneumatic and airflow conditions were important, but far more research was required, especially on transient air pressure waves. The frequency of their oscillations was of the same order of magnitude as electro-power frequency. As regards the physical aspect of the series breaks, instead of the parallel pneumatic arrangement they had chosen, in Sweden, the more flexible arrangement with series breaks mounted on top of one another with an extra control pipe for testing when pneumatic conditions were most suitable for the contact opening. Care must in all cases be taken with scale tests because of these pressure waves. Shortened air piping meant shorter time for the pressure wave to travel along the pipe and the result might differ on the model and on full scale.

Non-Linear Resistors Preferred

Most Swedish 220-kV air-blast breakers were equipped with non-linear resistors and the new 380-kV breakers would also have them. Full tests carried out about a year previously confirmed that non-linear resistors were a good solution of the problem of interrupting capacitance currents. The problem of electrical and thermal rating was more difficult to solve. On Sweden's 132-kV and 220-kV systems it had been found that the power frequency recovery voltage could be much higher than the normal voltage; 150 per cent was by no means the maximum. He suggested that 30 to 60 per cent unit tests for circuit severity were useless; one hundred per cent was essential.

He disagreed with the authors' view about overvoltages depending on frequency; it was a fact that there were higher overvoltages with a higher frequency in circuit. In Sweden, it had been the unofficial practice to add to the test series a curve showing breaking capacity as a function of the rate of rise and to check it by calculating the severity of the break at its particular location in the network.

MR. ROXBOROUGH said the authors' statement that the non-linear resistor made it easy to clear the current because of the long zero pause was true only of single-phase circuits and did not apply to three-phase breakers with a circuit that did not involve earth. The interruptor for resistor current could be simplified and made cheaper, and he felt sure that development would be carried out.

MR. FLURSCHEIM briefly replied to the points raised.

Correspondence

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents

Circuit Interruption

IN his article (3rd Dec.) Mr. R. W. J. Cockram seems to have misunderstood the oscillograph he reproduced as Fig. 2. He says it shows that, following the restriking transient, the general wave-form is re-established during the arcing period and that the voltage decreases as the arc resistance increases. All it actually shows, following the restriking transient, is the normal 50 c/s recovery voltage to a very extended time-scale. The arcing voltage is shown to the left of the restriking transient and is observed to be approximately constant at some low value.

Mr. Cockram does not state what types of "interrupting gear" have arcing times of "three to ten cycles," but a well-designed air-break circuit breaker would have an arcing time of not more than three half-cycles at the most, especially when interrupting heavy circuits.

In the same paragraph, the phrase "d.c. breaking conditions are employed" is used. What does this mean?

D. A. MURET, B.Sc., A.M.I.E.E.
Olton, Birmingham, 27.

Pumped Storage of Power

THE recent power cuts and plant failure have prompted me to seek enlightenment through your "Correspondence" columns why we did not take possession of the two pumped storage plants in Northern Germany which, by means of pumping to a high-level basin and utilizing this potential energy as required by water turbine generation, provide storage of electrical energy. The storage capacity is limited by the size of the high-level basin, in this case three-quarters of a million kWh each. I can only speak from practical experience of the desirability of having to hand a reserve of 240 MW, which was immediately available in the event of plant failure, or to deal with peak loads, and also enabled one to make full use of the meagre plant capacity that existed in parts of Germany after the cessation of hostilities.

I feel that some of your readers could say whether the merits and demerits have been considered for installations in this country, as to my mind the arguments for overwhelm those against this system.

Carmarthen. B. RABBETTS.

Asynchronous Generators

I WAS very interested in your editorial of 12th Nov. and the resulting correspondence regarding asynchronous generators. I am responsible for running and maintenance of three such generators driven by water turbines; the ratings are 103 kW, 81 kW and 43 kW. They have been in constant use for about thirty years, and one disadvantage these days is the tendency to race in the event of a total mains power cut.

I should be pleased to hear from your correspondents if there are any practical means of governing the turbines in the event of a power cut within reasonable financial limits. E. J. B.

Large-scale Small Cooker

WE would like to draw your attention to one or two points in the description of the Jackson "Giant" table cooker in your last issue.

One point which may be misconstrued is you state that a 5/6 lb joint of roast beef, a Yorkshire pudding and a fruit pie can be cooked "at once." In actual fact, they are cooked in *one cooking operation*, i.e., the fruit pie goes in first, after which its place is taken by the Yorkshire pudding, both being cooked in the time required for the joint and baked potatoes.

The measurements you give in your description are the overall dimensions of the cooker. An interesting point is that this meal for five people was cooked at a cost of 1¾d.

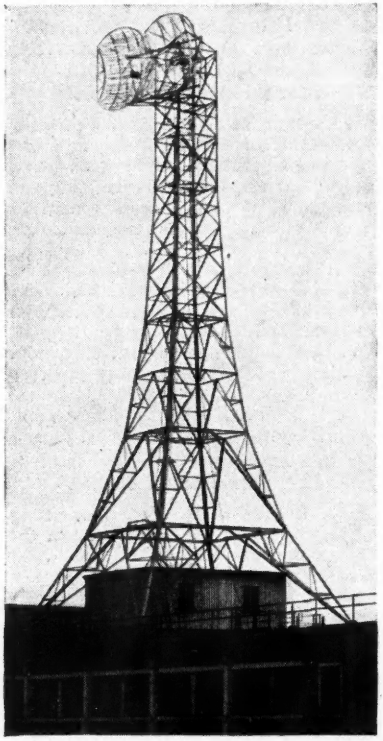
JACKSON ELECTRIC STOVE CO., LTD.
London, S.W.1. H. S. RENTELL, *Publicity Manager.*

Background Knowledge

MAY I suggest to "C.E.O." to place in his library, which should portray his background knowledge, Lewis Carroll's *Alice in Wonderland*. J. E. S.

Television Aerial

THE first of six aerials to be constructed between London and Birmingham for the television link has been erected at the Museum telephone exchange, Tottenham Court Road, London. This terminal station, rising 175 ft above the street, has been designed by the General Electric Co., Ltd. The paraboloids have built-in electrical heaters for de-icing.



Aerial for the London-Birmingham television link

New Swedish Transmitter

RADIO broadcast transmitting equipment supplied to the Swedish Broadcasting Administration by Standard Telephones & Cables, Ltd., has set a new standard of quality of transmission. The equipment was recently put into operation on a frequency of 1131 kc/s at the 100-kW station at Hörby. Among the newly introduced design features the most notable is the use of the "inverted" or "grounded-grid" method of operation of the one high-power valve used in a single-sided radio frequency circuit to give the 100-kW carrier power. While this method of valve operation has proved invaluable in ultra-short-wave and short-wave amplifiers, this is believed to be the first time that the grounded-grid valve has been adopted in the medium-wave band.

Castle Meads Station

THE Central Electricity Board returns (1947) covering the former S.W. England and South Wales area again show Castle Meads, Gloucester, an easy first among twenty power stations, many of them of much greater capacity and operating on a three-shift basis.

The published figures return Castle Meads with a performance factor of 100.5 per cent and comparative availability of 97.4 per cent, the combined figure being 99 per cent as compared with the next highest of 95 per cent.

The actual thermal efficiency, excluding banking, has been returned at 26.13 per cent which is exceeded by only one other station at considerably higher pressure which returned 27.75 per cent. For a small medium-pressure station these results reflect great credit on both the designers of the station and those who man it under Mr. R. H. Bent, station superintendent. It may be recalled that Castle Meads attained first place in its group for the year 1946, as published in the Electricity Commissioners' Returns. The 1947 figures are not yet available.

Power Station Design

A NEW booklet of forty-three pages, entitled "Electric Power Supply," by T. H. Carr, formerly city electrical engineer at Bradford, consists of a series of articles originally published in the *B.E.A.M.A. Journal* to point out how good plant layout can be an assurance of continuity of supply and an insurance against the risk of partial breakdown crippling the whole station.

It is divided into three sections: steam boilers with associated plant; generators with auxiliaries; distribution equipment and sub-stations. The purpose of economic design is explained broadly and the percentage cost figures quoted are up to date, the general outline representing standard modern practice. The booklet is published at 2s, including postage, by Cyril Williams Publicity, Ltd., 69, Swan Arcade, Bradford, Yorks.

PERSONAL and SOCIAL

News of Men and Women of the Industry

BRITISH Railways, Eastern Region, has appointed **Mr. I. J. R. Cookman** district electrical assistant, Nottingham, as district electrical assistant, Guide Bridge. Mr. Cookman was apprenticed at the Stratford Locomotive Works and was awarded the L.N.E.R. Directors' Scholarship for a three years' course at Queen Mary's College, London University, and a final year at King's College, Cambridge, graduating B.Sc. (Eng.) He held posts at Darlington, Dukinfield and Gorton before being appointed to his present position at Nottingham.

Mr. P. G. J. Pennings, chief of Factory Relations Department at Philips' Mitcham Works, has left the United Kingdom to take up a post at Sao Paulo, Brazil. On arrival there Mr. Pennings will begin negotiations with local authorities to prepare for the start of manufacture of electric lamps and radio receivers at the Philips factory which has recently been established in the district. Before their departure Mr. and Mrs. Pennings were entertained to dinner at Kettner's by the Philips management. Mr. Pennings has been with the Philips organization for fifteen years. In addition to being chief of factory relations at Mitcham, he was secretary of the production management board.

Mr. C. Wallace Saunders, M.I.N.A., M.I.Mar.E., A.M.Inst.C.E., A.M.I.Mech.E., for thirty years manager of the Marine Department of the General Electric Co., Ltd., whose retirement was recently announced, created the Marine Department when he joined the company after being demobilized in 1918. He was born in Dunedin, New Zealand, and after serving a general mechanical apprenticeship, he went to sea in 1906 and three years later obtained his chief's certificate in London. He then took the electrical engineering course at the City and Guilds College and gained practical experience in various electrical works and at Twickenham power station. During the past thirty years he has been closely associated with the building of a number of electrically propelled ships, including the *Monarch of Bermuda* and the *Queen of Bermuda*.

Mr. C. Wallace Saunders

Mr. Ivor Williams has been appointed manager of the Domestic Cooker Department of the General Electric Co., Ltd., in succession to **Mr. D. G. W. Acworth,** now manager of the Export Department. Mr. Williams joined the Cardiff Branch of the G.E.C. in 1924 and at the outbreak of war was manager of the Lamp Department in the South-Western Area. During the war he was a major in the South Lancashire Regiment and was awarded the M.B.E. He returned to Cardiff in 1946 as manager of the Heating Department. He is well known in South Wales sporting circles, having played rugby football for Great Britain in South Africa in 1938.

Mr. I. Williams

Thos. W. Ward, Ltd., announce that four of their local directors have now been made directors of the company. They are Messrs. P. T. Ward, G. S. Wood, J. S. Bradshaw, and E. G. Mort.

Mr. George Pegg has retired from the position of managing director of A. P. Lundberg & Sons, Ltd., after fifty-six years with the company. At a recent luncheon held at the Connaught Rooms a presentation was made by the chairman, Mr. A. G. E. Briggs, on behalf of the directors, staff and employees of the company. Mr. Pegg was a pioneer in the development of small switches and the provision of special switches to meet peculiar individual requirements.

Mr. F. E. Rowland, M.I.E.E., who is the manager of the Agricultural Department of the General Electric Co., Ltd., has recently returned from an extensive tour of the United States and Canada, during which he investigated the latest developments in electricity in agriculture. During his tour Mr. Rowland read a paper to the American Society of Agricultural Engineers on "Some Aspects of Agricultural and Horticultural Electrification in Great Britain". In his capacity as a vice-president of the Institution of British Agricultural Engineers he took a message of greeting to the A.S.A.E. and was elected a member of that Society during his visit. Mr. Rowland also showed the new E.D.A. film "Electricity in Clean Milk Production" at a number of universities, to power com-

panies and also to the Rural Electrification Administration of the U.S. Department of Agriculture.

Mr. William McGeoch, A.M.I.E.E., chairman of William McGeoch & Co., Ltd., celebrated his eightieth birthday on 8th December, and was entertained to dinner at the Midland Hotel, Birmingham, by the directors and senior executives of the Birmingham works, together with their wives. During the evening presentations were made to him on behalf of the staff and employees. Major P. McGeoch, works managing director, presided, and Mr. L. A. McGeoch,

Presentation to Mr. W. McGeoch, showing (left to right) Mr. G. Shale (chairman, Works Welfare Society), Mr. C. C. Knowles (works manager), Mr. W. McGeoch and Major P. McGeoch (works managing director)

chairman of the company, proposed the health of Mr. W. McGeoch, who replied. In addition to those shown in the accompanying picture, the directors present included Mr. A. McGeoch (London office), Mr. H. McCowan (Glasgow) and Mr. A. Stewart (Birmingham). Mr. I. Macqueen, works production manager, was also present.

The easing of Ministry of Food regulations enabled the **Association of Electrical Machinery Traders** to revive its annual dinner and dance, which was held last Friday at the Savoy Hotel, London, W.C.2, over 200 members and guests attending. In proposing the toast of the guests, Mr. L. Bowers (chairman) spoke of the necessity for traders to belong to their appropriate trade association to protect their interests. It was difficult for the trader to keep pace with the multiplicity of orders and regulations, and when amendments were desirable the trade association was able to make representations. After the dinner there was dancing and during the evening an electric washer presented by H. Fisher (Oldham), Ltd., was auctioned twice and increased the Association's funds by over £150. An appeal by Mr. W. E. Lawton, the Association's president, for the Electrical Industries Benevolent Association resulted in a collection of over £30. An excellent cabaret added to the evening's enjoyment.

The annual presentation concert of the Telcon Social and Athletic Club **(Telegraph Construction and Maintenance Co., Ltd.)** was held at the company's Greenwich works on 8th December. The Telcon Concert Party gave a first-rate entertainment, after which the chairman of the company, Lord Colgrain, presented the prizes and trophies for indoor and outdoor games. Congratulatory letters and cash awards were also presented to successful examination candidates under the Telcon Educational Scheme. Sir Geoffrey Clarke, the managing director, spoke of the proposed lease of an additional piece of land adjoining the Telcon sports ground, Kidbrooke, which would make it one of the finest grounds of its kind in South London. Other directors present were Messrs. J. N. Dean, B. H. Musgrave, W. F. Randall and Dr. E. W. Smith (Submarine Cables, Ltd.).

On 3rd December the annual Christmas dinner and dance of the **Crompton Parkinson, Ltd. (Birmingham Branch) Social Club** was held at the Midland Hotel, Birmingham. About sixty members of the staff and their friends were entertained. Music was provided by Don Clarke and his band, and entertainment by Dick Lawler. Mr. J. Tamblyn, a member of the Birmingham branch staff, undertook the duties of chairman for the evening. On the following afternoon the club held its annual children's Christmas party at the Botanical Gardens, Edgbaston, Birmingham. The children were entertained by games and a cinema show. Each child received a present. Mr. G. A. Christmas, a member of the Birmingham branch staff, took the part of Santa Claus.

About 250 members and friends were present at the annual dinner, dance and cabaret of the **J. & P. Staff Association** at Pyne's Restaurant, Lewisham, on 10th December. In proposing the toast of "The Company," Mr. H. J. Olley (chairman of the Association) mentioned the good relations between management and staff typified by the bonus announced that morning. Mr. G. Leslie Wates, chairman and joint

managing director of Johnson & Phillips, Ltd., in the course of his reply, detailed the amazing number of courses in the dinner given by the founders, Messrs. W. Johnson and S. Phillips, to their staff in 1884.

A meeting and luncheon for chairmen of education committees and chief education officers was recently organized by the South-Eastern and Southern E.D.A. Committee; the chairman of the Committee, **Mr. C. F. Wells** (chief commercial officer, South-Eastern Electricity Board) presided. An assembly of sixty was shown the four new E.D.A. and other educational films. The audience expressed sincere appreciation of the film work of the Association.

Mr. I. D. MacLennan, chief electrical engineer, Sierra Leone Government, is now on leave in this country. **Mr. E. Kent** is acting for him during his absence.

Obituary

Mr. H. J. Garnett.—The death occurred on 3rd December of Mr. H. J. Garnett, formerly works manager of the Telegraph Construction and Maintenance Co., Ltd. Mr. Garnett had been associated with the company for the past fifty-eight years, joining the staff in 1890 at the age of eighteen. He became chief chemist, and subsequently manager of the company's Wharf Road works, a position which he also held at the Telcon works when all T.C. & M. activities were consolidated at Greenwich in 1932. Mr. Garnett retired from the managerial position in 1935, but remained in the active service of the company as technical adviser until his death.

Mr. E. S. M. Prichard.—The death occurred on 27th November of Mr. E. S. M. Prichard, A.M.I.E.E., for many years manager and director of the New Switchgear Construction Co., Ltd. He was sixty-four. Mr. Prichard served his apprenticeship with the British Westinghouse Co. and then had a position in the company's switchgear sales department. He joined the New Switchgear Construction Co. in 1919 and remained with it until his retirement from business in 1944.

Mr. A. F. Martin.—Several business friends attended at Bandon Hill Cemetery, Surrey, last Friday, for the funeral of the late Mr. Albert Frank Martin, London sales manager of Thor Appliances, Ltd., who died on 6th December, aged fifty-four. Mr. Martin had been connected with the company for about twenty-five years. In addition to the widow, three brothers and a sister, there were present, Mr. W. Angus, a director of Thor Appliances, Ltd., with Messrs. H. Best, W. T. Barker and J. Biley, and Mr. A. Goodhew of the South Eastern Electricity Board.

Mr. H. Longthorpe, who was with the Churchill Machine Tool Co., Ltd., for thirty-seven years until his retirement last March, died early this month, aged sixty-three.

Will.—Mr. J. S. Dow, president of the Illuminating Engineering Society in 1946 and formerly hon. secretary, who died on 12th August last, left £41,967 gross (£41,871 net). Among his bequests are 250 shares each in the Illuminating Engineering Publishing Co., Ltd., to his co-directors Arthur Cunnington and Arthur Blok, £250 to the Illuminating Engineering Society for the encouragement of research, and the remainder of his shares in the company to give effect to his wishes.

E.D.A. Area Chairmen

AT recent meetings the following were elected chairmen and deputy chairmen of the Area Committees of the British Electrical Development Association:—

London and Eastern Area.—Chairman, Mr. E. A. Mills (deputy chairman London Electricity Board).

South Eastern and Southern Area.—Chairman, Mr. C. F. Wells (chief commercial officer, S.E. Board); deputy chairman, Mr. J. L. Bates (district officer, Reading, Southern Board).

North Eastern Area.—Chairman, Mr. W. A. Royle (chief commercial officer, N.E. Board); deputy chairman, Mr. W. K. Fleming (manager, Harrogate Sub-Area, N.E. Board).

Midlands and East Midlands Area.—Chairman, Mr. H. J. Gibson (chief commercial officer, Midlands Board); deputy chairman, Mr. N. F. Marsh (chief commercial officer, E. Midlands Board).

Yorkshire Area.—Chairman, Mr. F. Newey (deputy chairman, Yorkshire Board); deputy chairman, Mr. F. A. Ellis (manager, Huddersfield Sub-Area).

South Western Area.—Chairman, Mr. S. F. Steward (chairman, South Western Board); deputy chairman, Mr. H. Midgley (deputy chairman, South Western Board).

South Wales Area.—Chairman, Mr. L. Howles (chairman S. Wales Board); deputy chairman, Mr. E. Jones (deputy chairman S. Wales Board).

North Western—Merseyside and North Wales Area.—Chairman, Mr. P. Bregazzi (manager, No. 1 Sub-Area, Merseyside and N. Wales Board); vice-chairman, Mr. R. A. S. Thwaites (deputy chairman North Western Board).

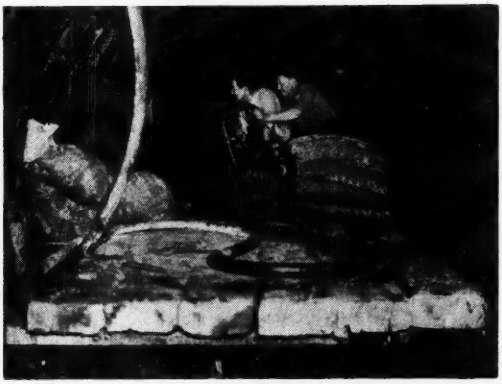
Scottish Area.—Chairman, Mr. W. S. Sawtell (chairman S.E. Scotland Board); vice-chairman, Mr. W. D. D. Fenton (secretary and commercial engineer, N. of Scotland Hydro-Electric Board).

Thames Cable Tunnel

Work Nearing Completion

As the existing cable tunnel under the Thames from Battersea power station was full to its capacity, the construction of a new tunnel was begun in September last year, and the operations are expected to be completed in January. The new tunnel runs from the Battersea "B" station switch-house, under the coal store and coaling jetty and under the river to a surface point in Chelsea Bridge Road, near Ebury Bridge Road with a branch tunnel to Chelsea Embankment.

To have driven the tunnel direct from point to point would have involved a diagonal river crossing bringing the tunnel directly under one of the piers of the Victoria railway bridge. For this reason the tunnel approaches midstream in a curve which brings it through the centre span midway between the bridge piers and once clear of the bridge the tunnel again sweeps in a curve to the north bank.



Work in progress on the new Thames cable tunnel

The tunnel is 8 ft in internal diameter, lined with cast iron segments and will be about 2,500 ft long. It is 76 ft below ground at the south bank and has a minimum clearance below the river bed of 16 ft, 4 ft of which is London clay.

The work has proceeded continuously in eight-hour shifts, averaging 6 ft per week. A Greathead shield was used and the average labour force was 25 men. The tunnel was designed and its construction supervised by the engineering staff of the former London Power Co., Ltd., and, since vesting date, of the London Division of the British Electricity Authority. The work has cost about £150,000.

In the Courts

Damages for Accidents

In the King's Bench Division of the High Court on 9th December, Mr. Justice Hilbery concluded the hearing of an action by Mr. Charles W. Barcock, Brighton, against Brighton Corporation to recover damages for injuries received in an accident at Paston Place sub-station in 1946. He was extensively burned and suffered injuries necessitating the amputation of part of his right arm. The plaintiff alleged a breach of the Corporation's statutory duty as to the appliances in the substation and a breach of its common law duty to have a safe system of working in the substation. The defence was that the plaintiff knew he was taking a risk when working on the switchgear.

His Lordship, in giving judgment for the plaintiff for £3,700 and costs, pointed out that the plaintiff, who was 47 years of age, had lost his right hand in the accident. He did not think that the plaintiff's case depended entirely on breach of the statutory regulations, and in his opinion he had established a breach of duty by the Corporation at common law. The Corporation said that if Mr. Barcock had read the regulations and construed them correctly, he would have realized that plant on which the work was to be done by him must be made "dead." He did not think one devised a system of work by telling a man "Read the regulations and don't break them." In his view no responsible person on behalf of the defendants had devised any system for doing this particular work.

Awards for Widows

In the King's Bench Division on 10th December, Mr. Justice Hilbery awarded damages to two widows for the deaths of their husbands while at work. Mrs. Mary Ann Ringshaw, Brighton, was awarded agreed damages of £2,000. Her husband, aged 54, was a fitter in the employ of the Brighton Corporation at the Surrenden Road electricity substation, and in December, 1946, while changing a current transformer, was badly burned. He died five days later.

Mrs. Marguerite P. Trissider, Wimbledon, whose husband was killed by electric shock at Wimbledon Theatre, was awarded £2,500.

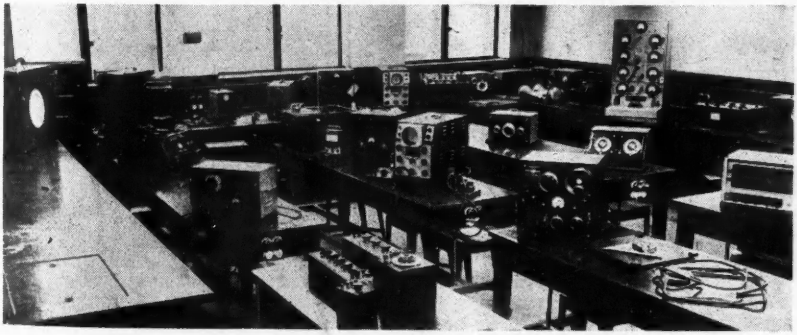
Educational Developments

NEW PHYSICS LABORATORY AT THE BOROUGH POLYTECHNIC

THE opening of a new advanced physics laboratory at the Borough Polytechnic, London, last week by Sir Arrol Moir is indicative of the changes and developments which are at present taking place in electrical engineering education. More basic work is now required, particularly in the field of physics, which must be supported by an extension of the mathematics curricula. Today, industry not only requires this broader basis in training but demands a greater degree of specialization with, for light current engineers, such subjects as high-frequency measurements, television and advanced physics (alternatives being provided for those interested in heavier work), which are usually studied after graduateship or the Higher National Certificate course. This is made possible by means of the part-time day release schemes in which most firms participate.

Corner of the new physics laboratory

At the Borough Polytechnic, students who attend evening classes only are now in the minority. Most students attend one or more days a week, released by their employers, thus allowing the developments mentioned above to be introduced into the courses. Special facilities are also provided for men whose studies have been interrupted by service in the Forces. These comprise more intensive training of one year's duration for the Ordinary National Certificate, followed by a period in industry and subsequently by a further intensive course for the Higher National Certificate. Again, in these full-time courses it is possible to study electrical engineering on a broader basis and include special subjects in the final stages.



Radio measurements laboratory

In the new physics laboratory, named after Sir Ernest Moir, who left a legacy to the Polytechnic for providing this and other improved educational facilities, specialization is in the study of light and thermionic emission. The equipment includes special spectrometers, photo-electric photometers and apparatus for the investigation of the interference of light. High-vacuum equipment is also available for the study of emission and electrical discharges through gases.

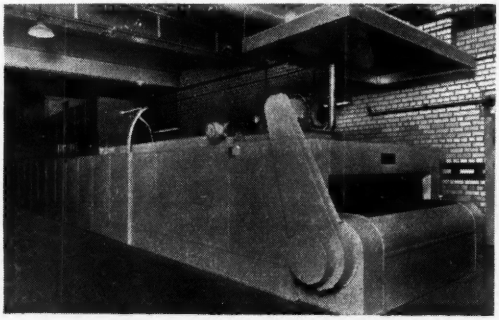
At the same time the radio measurements laboratory has undergone some reorganization and it is now possible to make tests on dielectrics at high frequencies together with measurements on wide-band amplifiers and modern u.h.f. oscillators, such as klystrons and magnetrons. A high-voltage supply is also available for use in conjunction with a Schering bridge to perform loss measurements on insulating materials.

These new laboratories have fulfilled a very real need in meeting the requirements for the training of engineers, as is evidenced by the great demand which exists at present for courses, particularly those involving day attendance at the Polytechnic.

All-Electric Bakery

COMPREHENSIVE EQUIPMENT AT ST. HELENS ESTABLISHMENT

WHEN fully equipped, the bakery of the St. Helens Co-operative Society will be one of the largest all-electric bakeries in the British Isles. The contract for the scheme, which was obtained by the General Electric Co., Ltd., in competition with gas heated and oil fired equipment, comprises the installation of two 50 ft. travelling ovens, two double-deck drawplate ovens, an electrode steam boiler and storage water heaters of varying capacities. At a later date it is proposed to install at the bakery further drawplate ovens and a brick-built Vienna oven.



One of the two 50 ft travelling ovens installed at the St. Helens Co-operative Bakery

The two travelling ovens are already installed. They are of the straight-through travelling soleplate type. Each oven has a maximum capacity of 1,200 loaves per hour, measures internally 50 ft. long by 8 ft. 3 in. wide and has a total electrical loading of 450 kW. To ensure the correct temperature and at the same time provide the required temperature variation, the oven is divided into four sections, in each of which the top and bottom elements are separately controlled automatically. Mercury-in-steel indicating and automatic controllers provide the means of setting the temperature in each section. The main supply to each oven is taken from the substation to a triple-pole non-drawout pattern oil circuit breaker, which provides the master control for each oven. Each circuit breaker has a rupturing capacity of 25,000 kVA at 440 V.

Steam supply to the oven and the automatic provers is provided by a fully automatic electrode steam boiler with a connected maximum loading of 70 kW. The hot water storage heaters comprise one 300-gallon, one 200-gallon, two 50-gallon and two 30-gallon models, all of the pressure type. These have a total connected load of 99 kW. A number of electric unit heaters (total loading 50 kW) are also to be installed for maintaining the required temperature in the dough room and flour store of the bakery.

The further drawplate ovens and the Vienna oven which it is proposed to install will provide an additional connected load of 290kW. The contract for the installation of the equipment also includes the provision of a completely new and up-to-date lighting system.

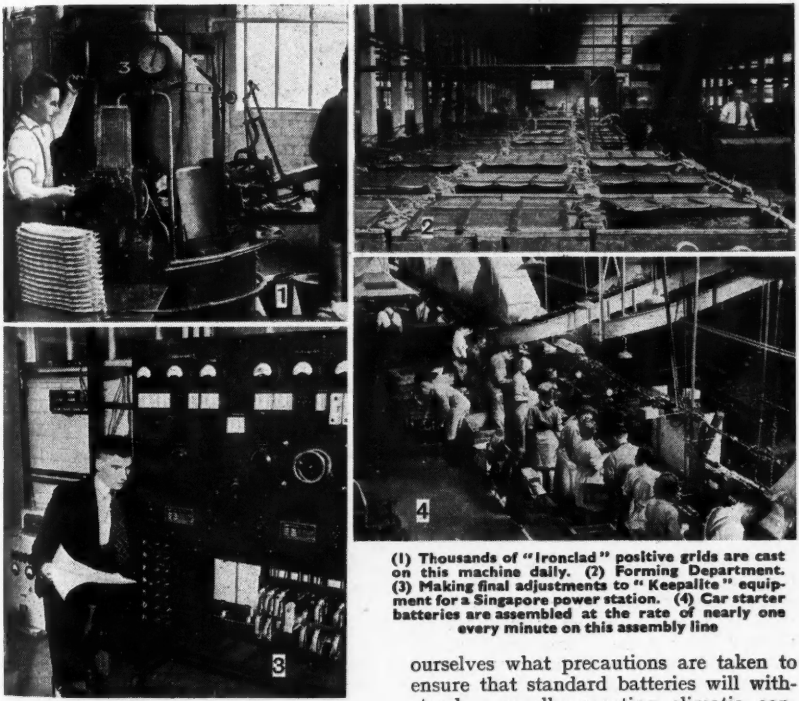
Storage Battery Production

LARGE-SCALE MANUFACTURE FOR EXPORT

ACCORDING to the official Board of Trade returns the value of electric storage batteries, parts and accessories (excluding primary batteries) exported from the United Kingdom during the first ten months of this year was over six times that for the corresponding period of 1938, the actual figures being £2,901,045 and £486,464 respectively. Some of this impressive increase is admittedly due to the rise in prices, especially of lead, which now costs over £130 per ton instead of £25; but the advance is nevertheless very substantial. Perusal of the "Monthly Digest of Statistics" gives an even more satisfactory picture, production figures for accumulators for export for the January-August period amounting to £2,773,000 out of a total accumulator production valued at £9,254,000.

An important part of this trade is attributable to the Chloride Electrical Storage Co., Ltd., which possesses in its Exide Works at Clifton Junction, near Manchester, the largest battery factory in the Empire.

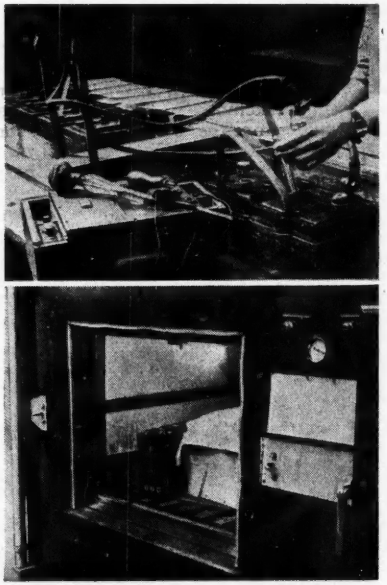
Generally the standard battery produced for the home market is suitable for operation in any part of the world, but occasionally apparatus with special characteristics is called for. To see for ourselves what precautions are taken to ensure that standard batteries will withstand unusually exacting climatic conditions, and also what special features are incorporated to meet exceptional requirements, we recently paid a visit to the company's works.



(1) Thousands of "Ironclad" positive grids are cast on this machine daily. (2) Forming Department. (3) Making final adjustments to "Keepalite" equipment for a Singapore power station. (4) Car starter batteries are assembled at the rate of nearly one every minute on this assembly line

Here in a factory extending over 15 acres and employing nearly 2,000 people (there were 3,600 during the war) are made almost every type of lead-acid storage battery from the minute hearing-aid units of only 3 Ah to the huge banks of three hundred and thirty-six 6,000 Ah submarine batteries.

The original Planté cell is still the most suitable for stationary batteries used for power and lighting but several other types have been evolved with greater plate surface area, with the object of securing a high capacity / weight ratio. The "Exide-Ironclad" battery, for instance, now used very largely for traction purposes, has positive plates in which the active material is surrounded by ebonite tubes threaded on rod-type grids. Besides being capable of a high discharge rate, these batteries, (the name of which denotes strength and has nothing to do with the metal used in construction) show a saving of 45 per cent in weight over the Planté type, a very important feature for traction work.



Batteries undergoing tests under reproduced tropical (top) and arctic conditions

A device employed in a composite Planté positive plate to obtain greater surface area is the incorporation of "rosettes" of gimped lead strip, the gimping itself increasing the surface area eight times; we saw some of these being made to meet an order from India for train lighting cells. Commonly used in conjunction with the Planté or "rosette" positive plate is the box negative, consisting of two perforated grids riveted together, embracing the active material inserted between them.

Exide batteries constitute a large proportion of the production; the positive and negative plates alike consist of antimonial lead grids with lattice cross-ribs on each face to afford the mechanical and electrical support for the active material applied to them in the form of paste.

Throughout the factory mechanized methods have been adopted wherever the quantities involved justify them. In the grid moulding department, for instance, several thousand "Ironclad" positive grids are produced daily on a single three-mould machine. Inter-cell connectors are made on a rotary mould. Special gate-cutting machines remove surplus lead from the grids for re-use.

Each week the factory produces about a million plates for all purposes. Filling of the "Ironclad" positive plates is done at a high rate by means of a continuous production line in which the lead oxide is fed in, the bottoms of the plates are levelled off, the plates are checked, and finally immersed in a solution to consolidate the powder.

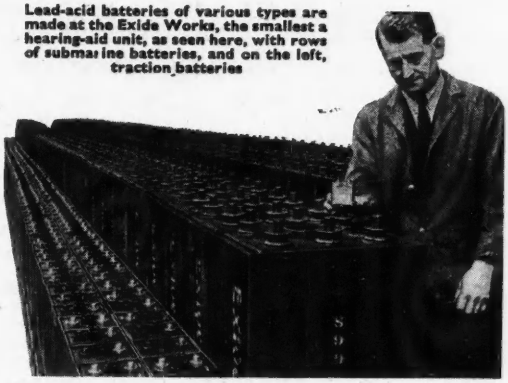
By means of conveyor-type pasting machines used for the popular types of pasted plates, the daily output is greatly increased over ordinary hand-pasting methods. After pasting, the plates are dried in ovens which have special thermostatic controls to regulate the temperature and humidity.

After being placed on circuit in the forming tanks where the positive plates assume their chocolate colour on becoming lead peroxide, and where the negative plates become pure lead, the plates are dried and passed on to the plate-cutting department. Here the up-to-date equipment includes break-apart machines which automatically cut pairs of plates

and trim their lugs at the rate of many thousands a shift.

On each of the six assembly conveyors twenty-eight operators between them produce batteries at a rate of nearly one a minute; the loose plates, separators, cases, etc., are fed in at one end and the completed battery sealed and tested leaves at the other. Every care has to be taken in the choice of sealing compound for batteries destined for overseas. If too soft a type is employed for a hot country it melts, while in a cold climate hard compound tends to crack. Various types of separators are employed, depending upon the climatic conditions, and the purpose for which the batteries are used. Most traction and car starter batteries going abroad have ebonite containers.

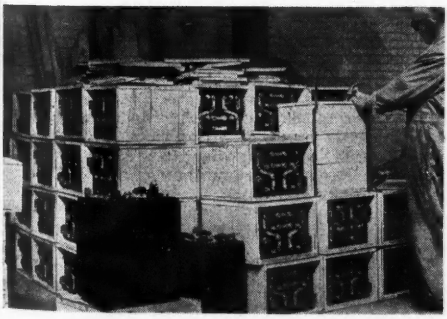
In the Test and Research Department, batteries are subjected to extremes of temperature. In a Kelvinator refrigerator arctic conditions with temperatures down to −47 deg F are reproduced, while to simulate tropical conditions there is a thermostatically controlled hot-water tank giving temperatures up to 150 deg F or higher. In this department we were shown some special batteries for use in high-flying aircraft, and also some special self-priming batteries for lifeboats, etc. The latter are sent out with dry charged plates in a sealed celluloid container with acid in a reserve chamber. The electrolyte is admitted to the container when the battery is required, by piercing the wall between the chamber and the container with a metal punch provided. Within 15 minutes 75 to 80 per cent of the rated capacity is available.



Lead-acid batteries of various types are made at the Exide Works, the smallest a hearing-aid unit, as seen here, with rows of submarine batteries, and on the left, traction batteries

Receiving its final adjustments in an equipment testing department was a "Keepalite" emergency lighting and switch-closing equipment for a power station at Singapore. Numerous overseas orders are in hand for plant of this kind.

In the Despatch Department four-cell "Ironclad" batteries of a new type for use in South Africa were being packed. Many Planté-type batteries are being supplied for the lighting of tea plantations, etc., in India, which is also taking a considerable number of special batteries with extra-thick plates and special terminals for communal radio sets. There is a world-wide demand for car batteries. For use in situations such as mines where it is difficult to give batteries adequate care, models with an exceptionally deep mud space and headroom are supplied.



"Ironclad" batteries of a new type being packed for despatch to South Africa

"Ironclad" batteries are now largely used for railway duties.

The packing cases used are designed to minimize careless handling, while waxed paper and waxed wood are employed extensively to prevent damage from acetic acid exuding from the wooden cases. A new method of packing certain models eliminates the need for wooden crates.

A.B.E.-Brush Merger

PROPOSED INCREASE OF CAPITAL

SUBJECT to the approval of stockholders of both companies at extraordinary general meetings to be held on 31st December, a scheme for the merging of the oil-engine interests of Associated British Engineers, Ltd., with the Brush Electrical Engineering, Ltd., is to be carried through.

The A.B.E. companies involved are Mirrlees, Bickerton & Day, Ltd., and J. & H. McLaren, Ltd., and the consideration for their acquisition, with minor ancillary assets, by the Brush Company will be £1,598,319, to be satisfied by the issue to A.B.E. of £530,000 of Brush 5½ per cent cumulative preference stock at par and £800,000 of ordinary stock at 6s 8d per 5s unit. (These prices are roughly equal to the market prices at the date of completion of the negotiations last month.) There will also be an adjusting cash payment amounting to £1,652.

This transaction will leave A.B.E. with a 50 per cent interest in the Brush capital of both classes, i.e., £500,000 preference and £800,000 ordinary, and this will constitute 75 per cent of A.B.E.'s entire assets. A voting trust has been arranged to restrict A.B.E.'s voting power to 25 per cent of the votes attaching to the Brush ordinary capital.

Accountants' Opinion

Mr. Alan P. Good, deputy chairman and managing director of the Brush Co., is chairman of A.B.E. and holds £97,778 of the latter company's £168,000 ordinary stock; other directors of the Brush Co. have minor personal interests. Because of this the directors instructed two prominent accountants to examine the proposals. The accountants drew attention to the serious deficiency of working capital and while approving the merger scheme considered that it should not be carried through before permanent capital of at least £1½ million had been raised by the Brush Co.

The directors of both companies agree to this necessity but do not expect to be able to raise the additional capital before mid-1949. In the meantime they have been able to secure additional support from the companies' bankers who are now providing the group companies with facilities totalling £4 million. A.B.E. is also prepared to market the £500,000 Brush preference stock received under the scheme and apply the proceeds in subscribing for or underwriting a new issue.

It is stated that the merger will give effect financially to existing working arrangements between the companies concerned. The intention is to concentrate the production of diesel and petrol engines in the Mirrlees and McLaren works leaving the Brush Company free to expand its purely electrical work at Loughborough. Orders on the books of the group are said to be valued at £15 million (including £5 million for Russia) and the present rate of output exceeds £10 million per annum. The joint working arrangements have already resulted in increased output and profit and further benefits are expected from the merger. It is estimated that the group net profits will be not less than £800,000 for 1948 (against £547,203 for 1947) subject only to taxation; the latter item, it is said, will be small.

Further Russian Contract

The Brush Co. and J. & H. McLaren, Ltd., have signed a further contract with the U.S.S.R. Trade Delegation for the supply of 2,850 standard self-contained 50-kW diesel generating sets. It is believed that this contract, which is valued at over £5½ million, is the largest ever to be placed for a standard range of diesel generating plant.

Production of these units, which are assembled at McLaren's Leeds factories, the electrical equipment being supplied by the Brush Company, is to be increased immediately by 25 per cent and the fulfilment of the order will ensure employment at the Leeds and Loughborough factories for the next two years. The signing of this contract brings the total value of the order book for the group to over £20 million.

I.E.E. Students

AT a meeting of the London Students' Section of the I.E.E. last week a paper was read by MR. F. GRANT on the fundamental principles of the sale of electricity to consumers. By way of introduction, references are made to the various Acts of Parliament which are the basis of the general law of electricity supply in this country today. In order to clarify the present position the conditions obtaining before the inauguration of the B.E.A. are briefly outlined. The factors affecting generation costs are mentioned with an explanation of the primary purpose of the grid system. After discussing the economics of the grid, the author concludes with an outline of the various tariffs which are available to consumers today.

COMMERCE and INDUSTRY

Electricity Consultative Councils : Use of Fluorescent Powders

WE referred in our last issue to the announcement of the members of the first Electricity Consultative Council to be set up under the 1947 Electricity Act—that for the South-Eastern Area. It is now stated that the secretary is Mr. G. Wray, O.B.E., 5-6, Lancaster Place, Strand, London, W.C.2.

The formation of the Yorkshire Council has also been announced. The chairman (appointed previously) is Alderman W. Leach (Barnsley), the deputy chairman Councillor J. W. Holland (Sheffield) and among the members is Mr. J. C. M. Maclagen, managing director of Greenwood & Batley, Ltd., Leeds. Mr. E. Luscott, B.A., F.C.I.S., of headquarters staff of the Yorkshire Board, is acting as secretary *pro tem.*

The third Council to be appointed is that for South Wales. Alderman A. E. Gough (Cardiff) is chairman, and Mr. L. D. Williams (Pontyclun, Glam.), deputy chairman. Among the members is Mr. J. Wayne-Morgan, M.I.E.E., M.I.Mech.E., the Cardiff consultant.

Scottish Law for Electrical Contracts

Lord Citrine, chairman of the British Electricity Authority, has informed the Lord Advocate that arrangements have been made for contracts placed by the British Electricity Authority with Scottish contractors for work in Scotland to be governed by Scottish law.

The Authority is also prepared to re-open any such contracts now current and to apply Scottish law if it is asked to do so by the contractor. Hitherto the Authority's contracts in Scotland were governed by English law.

Control of Engagement

After consultation with the National Joint Advisory Council and the Women's Consultative Committee, the Minister of Labour and National Service has decided to extend the operation of the Control of Engagement Order, 1947, for a year from 1st January, 1949, and has made the Control of Engagement (Amendment) Order, 1948. (S.I. 1948, No. 2608, H.M. Stationery Office, price 1d.)

Electrical Employment

There was a further small increase in the number of insured workers in the electrical engineering industry in September. The *Ministry of Labour Gazette* (November) gives the total as 162,400 (including 49,500 women), against 162,100 in August and 154,300 in mid-1947. In the electrical wiring and contracting industry workers in September numbered 63,700 (including 5,700 women), compared with 63,300 in August and 57,900 in mid-1947. Corresponding figures for employment in the manufacture of electrical apparatus, cables, lamps, etc., were 268,900 (121,600 women) in September, against 268,100 in August and 276,200 in mid-1947.

At 11th October unemployed persons in the electrical machinery section (Great Britain) numbered 1,549 (1,509 in September); in the electric wires and cables group 757 (714); telegraph and telephone apparatus (excluding valves) and gramophones 1,110 (1,299); radio valves and electric lamps 299 (315); batteries and accumulators 248 (270); other electrical goods 1,693 (1,889); electrical wiring and contracting 1,499 (1,530), and electricity supply 698 (637).

Among undermanned industries, during the four weeks to 29th September, 569 persons were placed in employment in the production of generating plant for electricity undertakings; this compares with 707 in the preceding four weeks. The number placed on power station construction was 807 (against 822) and on Scottish hydro-electric schemes 1,284 (1,136).

Fluorescent Powders

Following upon the recent inquest on a physicist engaged in the development of fluorescent lamps whose death was attributed to poisoning by beryllium compounds, several fluorescent lamp makers have issued statements to the effect that they do not now use these compounds. The British Thomson-Houston Co. and the General Electric Co. emphasize that the change was made for efficiency reasons. The G.E.C. says that, in its experience, there has never been any evidence that the zinc beryllium silicate previously used in discharge lamps for general lighting had any toxic properties. Both companies think it advisable, however, that reasonable precautions should be taken in breaking up old lamps.

Similar disclaimers have been made by Crompton Parkinson, Ltd., Siemens Electric Lamps and Supplies, Ltd., and the Edison Swan Electric Co., Ltd.

Control of Iron Castings Lifted

The Minister of Supply announced on 22nd November that iron castings were to be freed from control, and he has made the

appropriate Order (Control of Iron and Steel (No. 67) Order, S.I., 1948, No. 2630) bringing this into effect from 9th December. Licences are still required for the export of such castings; these are obtainable from the Iron and Steel Board, Bush House (S.W. Wing), Strand, London, W.C.2. The Order permits the acquisition, without authorization, of any quantity of electrical sheet (i.e., sheets having guaranteed specified electrical properties) and railway tyres, wheels and axles, for home and export.

Electrical Engineering Scholarship

Mrs. A. M. Scott, widow of Mr. J. S. Scott, A.M.I.E.E., of Ballynahinch, Co. Down, has made a gift of £1,000 to the Technical Instruction Sub-Committee of the Belfast Education Committee to provide a scholarship at the Belfast College of Technology in memory of her husband, a pioneer in the electrical engineering industry in Northern Ireland. The scholarship will be awarded annually to a student of electrical engineering who will also receive a bronze medal to be known as the J. S. Scott Memorial Medal.

Electrical Equipment on the "Caronia"

Practically the whole of the essential auxiliaries on the Cunard-White Star liner *Caronia* are electrically driven, and Laurence, Scott and Electromotors, Ltd., have supplied about 200 machines, totalling approximately 4,000 h.p., for this vessel. The motors are of the company's standard marine type, with minor modifications to Cunard standards. The main cargo winches are of the Scott D type, directly controlled and with the contactor gear accommodated in deck houses; they are rated for 5 tons at 125 ft per minute and a maximum of about 400 f.p.m. at light load. There are also 2-ton Scott winches for baggage, and 3-ton gangway winches. Two motor-alternators, each of 175 kVA, have been installed for the supply of fluorescent lighting. The company has also supplied twelve Scott winches, two 50 kVA motor-alternators and about fifty motors for the *Orcades*.

Trafalgar Square Christmas Tree

On 20th December the Mayor of Oslo will present to London the Christmas Tree in Trafalgar Square which again this year is a gift from the Norwegian Government. The tree will be decorated with 350 "Osram" 25 W colour-sprayed lamps and surmounted by a five-pointed star containing a standard "Osram" 100 W lamp. The design of the star was entrusted by the contractors, Whitcomb Electrical Supplies, to the Outdoor Lighting Department of the General Electric Co., Ltd., which has produced a star made of opal "Perspex," 2ft high and 6½in. wide. In addition to the lamps, the G.E.C. has supplied all the wedge type weatherproof lampholders and the cable.

Engineers' Guild

The first general meeting of the newly formed Metropolitan branch of the Engineers' Guild was held at Caxton Hall, Westminster, S.W.1, on 1st December. A talk by Mr. R. M. Wynne-Edwards on the aims and objects of the Guild was followed by a discussion.

At a meeting of professional engineers held in Birmingham on the 24th November, convened by the Engineers' Guild, it was agreed to establish a West Midland branch of the Guild, with headquarters in Birmingham, and a provisional committee was elected to deal with branch development.

Exhibition of Radiographs

An Exhibition of Industrial Radiographs will be held at the spring meeting of the Industrial Radiology Group at the Institute of Physics on 18th and 19th February next. Entries should be suitable for showing on standard viewing lanterns (mounted prints may also be submitted) and should, wherever possible, be accompanied by photographs or samples of the specimens which they represent. A short description should accompany each entry. Intending exhibitors should apply to the Institute of Physics, 47, Belgrave Square, London, S.W.1, for entry forms.

English Electric Apprentices

Addressing apprentices, parents, employees and guests, including the Lord Mayor and Lady Mayoress of Bradford (Ald. F. J. and Mrs. Cowie), at the works of the English Electric Co., Ltd., Bradford, on 3rd December Sir George H. Nelson, chairman and managing director of the English Electric group of companies stressed the vital need for the old spirit of craftsmanship in British industry. He said that this country could lead the world with a proper balance of technology and craftsmanship. He did not consider mass production to be suited either to our population or our traditions. Over 200 apprentices were presented with merit awards by Lady Nelson.

Purchase Tax on Washing Machines

The Electrical Association for Women has approached the Chancellor of the Exchequer stating that if women are to make their full contribution by working outside the home they must be able to take advan-

tage of labour-saving appliances inside the home. As clothes washing is the most arduous of all domestic tasks the Association urges that purchase tax should be removed from electric washing machines and from all similar motor-driven appliances which take very little electricity.

Austrian Electrical Industry

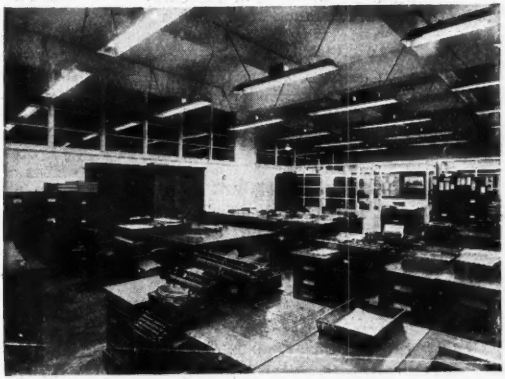
Though shortages of raw materials continue to face Austrian producers of electrical goods, the production of some lines, e.g., electric lamps, is now sufficient to meet demand. On the other hand, the output of heating apparatus and stoves is inadequate to satisfy domestic requirements. The shortage of raw materials in some branches is due mainly to insufficient imports, which have to be paid for by the foreign exchange earnings of the industry itself. The present high prices of Austrian exports are mainly responsible for the fact that the industry's sales abroad to-day, valued at about 70 million Austrian schillings annually (£1,750,000), are considerably below the pre-war level. An improvement in the raw material supply position, especially of copper and transformer sheets, is hoped for as a result of the Marshall Plan. Other items required from abroad are insulating materials, insulators, dynamo sheets, lead, porcelain, etc. An upward trend in export sales is noticeable, however, with shipments consisting mainly of generators, motors, transformers, radio receivers and parts, microphones, measuring instruments, telephone exchanges and electric irons. Great Britain, Holland, Turkey, Belgium, Greece, Czechoslovakia, Yugoslavia, Sweden, Egypt, South Africa, Italy and France are the principal customers.—*Reuter* (Vienna).

Decorated Vans

A new idea in van decoration has been adopted by Rowlands Electrical Accessories, Ltd. In addition to illustrations of its lighting fittings the company's vans are to portray types of lighting installations carried out with its fittings. The first van to be treated in this manner shows a church lighting installation by the side of which are illustrated the fittings employed.

Fluorescent Office Lighting

The ingenuity displayed in overcoming lighting installation problems presented by new types of building construction is demonstrated in the accompanying picture of the general offices of Gillette Industries, Ltd., Great West Road, Isleworth, Middlesex. In these offices the ceiling construction prevented the suspension of fittings direct from the ceilings. Resort was therefore made to the walls and longitudinal roof beams. As will be seen, care in aligning the fittings and chain suspension produced a pleasing result. The installation was planned by the Illuminating Engineering Department of Siemens Electric Lamps and Supplies, Ltd., in co-operation with Mr. S. A. Strode, A.M.I.E.E., chief electrical engineer of Gillette Industries, Ltd. "Sieray" 80 W open-top dispersive reflectors, spaced on approximately 8ft by 7ft centres, were used to give a lighting intensity of 20 lumens per sq ft. The "Sieray" equipment was supplied through Young & Wildsmith, Ltd.



"Sieray" fluorescent lighting in the offices of Gillette Industries, Ltd.

Sir Basil Brooke at Hopkinson Works

As part of an industrial tour of Wales, Sir Basil Brooke, Prime Minister of Northern Ireland, visited the factory of the Hopkinson Electric Co., Ltd., at Birchgrove, near Cardiff. He was conducted around the factory by Mr. L. D. Bennett, chairman of the Radio and Television Trust group of companies of which Hopkinsons is one, and by Mr. B. Hallows Garside, managing director of the company.

Industrial Finishing Exhibition

The first National Exhibition of Industrial Finishing to be held in this country will be held at Earls Court, London, from 31st August to 13th September, 1949. In addi-

tion to commercial stands for manufacturers supplying finishes and equipment, there will be a central technical exhibit of industrial finishes. Inquiries should be addressed to the Exhibition Secretary, 26, Old Brompton Road, London, S.W.7.

Metrovick Ex-Apprentices

The Metropolitan-Vickers Electrical Co., Ltd., is compiling a revised issue of its "Register of Ex-Apprentices and Ex-Trainees." (The last edition was issued in 1939.) Those who have not received a questionnaire form for sending their present particulars are invited to communicate with the Education Department of the company at Trafford Park, Manchester, 17.

Tobacco Growing

Mr. R. H. Coombes, whose tobacco growing nurseries were described in our issue of 3rd December, asks us to state that the plants are sold at 6d a dozen, not 6s as stated.

B.I. Callender's Pension Trust

British Insulated Callender's Pension Trust, Ltd., has been registered as a private company with a capital of £100, its objects being to act as trustees of the British Insulated Callender's Pension Fund.

New-Year Holiday

The works of Bruce Peebles & Co., Ltd., Edinburgh, will close on Friday evening, 31st December, and reopen on Thursday morning, 6th January.

Trade Announcements

Brookhirst Switchgear, Ltd., announces the appointment of Mr. J. Gordon Frater as manager of the London sales organization at 54, Victoria Street, S.W.1, as from the 1st January next. Mr. Frater has been a member of the Brookhirst sales organization for over twenty years. For ten years he represented the company in Yorkshire and the North-East Coast area and latterly has been in charge of the sales organization in the Midland area, operating from Birmingham. Mr. C. A. Phillips, who has held responsible posts on the technical staff for over twenty years and has assisted Mr. Frater in the Midlands, will be taking charge of the sales organisation in the Midlands, operating from 95, Colmore Row, Birmingham, 3.

Sterling Cable Co., Ltd., of Aldermaston, Berks, has now six additional telephone trunk lines (Reading 0080).

The completion of a new building extension adjoining the works of **"Diamond H" Switches, Ltd.,** in Gunnersbury Avenue, Chiswick, has considerably increased the company's productive capacity. Immediate delivery of three-heat cooker switches, thermostats, rotary and toggle switches, etc., can now be given, and the new nine-heat hot-plate switch is now in production.

Ekco-Ensign Electric, Ltd., announces that owing to limitations of storage space at its Manchester premises it has moved its service arrangements to the Kent Street Works, Preston, Lancs (telephone: Preston 4628). This applies to Ekco-Ensign Electric, Ltd., only and not to "Ekco" radio and "thermovent" servicing for which the Ekco Service Depot continues at 55, Whitworth Street, Manchester.

S. Wolf & Co., Ltd., have acquired additional factory space in Acton, London, W.3, for the further development of the "Wolf" range of portable electric tools. It is anticipated that the additional productive area now available will be in full operation within the next four to five months.

Protolite, Ltd., has removed to new offices at 144, St. Vincent Street, Glasgow, C.2 (telephone: Central 6806).

Brooks & Bohm, Ltd., have opened a new depot with trade counter at 25, London Road, Forest Hill, London, S.E.23 (telephone: Forest Hill 4315).

The Liverpool Branch of **Philips Electrical, Ltd.,** has removed to 6-10, Leeds Street, Liverpool. The telephone number remains unchanged.

Cantie Switches, Ltd., has moved into a new factory at Port Causeway, New Ferry, Birkenhead.

Catalogues and Lists

British Aluminium Co., Ltd., Salisbury House, London Wall, London, E.C.2.—A 29-page illustrated book entitled "Aluminium Paste" which deals with the characteristics of aluminium paint with information on painting technique and the storage properties and testing of aluminium paste.

The Chloride Electrical Storage Co., Ltd., Exide Works, Clifton Junction, nr. Manchester.—Folder on storage batteries for emergency lighting systems, etc.

H. K. Lewis & Co., Ltd., 136, Gower Street, London, W.C.1.—Priced catalogue of books on electrical engineering, radio and electronics.

G. T. Weston, Ltd., 130, Vaughan Road, Harrow, Middlesex.—Descriptive folder on drink and food mixers, toasters and breakfast cookers.

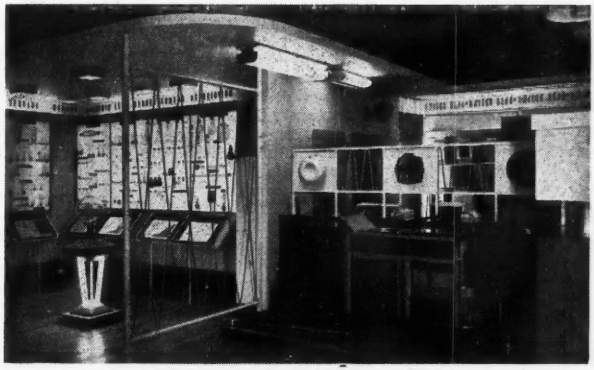
Bryce Electric Construction Co., Ltd., Kelvin Works, Hackbridge, Surrey.—Technical brochure on industrial capacitors (second issue).

Building Centre

ELECTRICAL SECTION OPENED

WITH the opening of the Electrical Section last week, the re-establishment of the Building Centre at 9, Conduit Street, London, W.1, is now completed. The general effect of the Electrical Section, which has been planned and installed by the British Electrical Development Association, in co-operation with the British Electrical and Allied Manufacturers' Association, the Electric Lamp Manufacturers' Association and the Cable Makers' Association, is excellent. The only criticism is one of space limitation, and Mr. V. W. Dale, general manager and secretary of E.D.A., expressed the hope at a Press visit that the Centre might in due course be able to allocate additional space.

The decorative scheme and general arrangement of the Section has been carried out in conformity with plans prepared by Mr. A. Hulme Chadwick, A.R.C.A., in collaboration with the Association's staff. The E.D.A. enquiry bureau is situated at the right of the entrance to the Section, and on the left the Lighting Service Bureau has a well-arranged display of illumination methods. There are sections showing domestic refrigerators, cookers, sectional models of electric water heaters, hot-water circulators incorporating electric immersion heaters, also sectioned to show the constructional features, and the cistern-type heater. A number of humorous figures in relief by Warner-Cooke show the system suitable to a particular problem.



Part of the electrical display at the Building Centre

Electric space heating and ventilation are covered by thermostatically controlled tubular heaters and two exhaust fans, various forms of space-heating appliances being shown, while electrical equipment for home laundering includes washing machines, ironers and airing cabinets. A large panel erected on the end walls has mounted on it examples of installation accessories. The general lighting of the Section is fluorescent, and suspended from the ceiling there is a range of modern electric lighting fittings. The display will be changed from time to time to keep abreast with developments.

In performing the official opening ceremony on 9th December, Mr. J. Eccles, chairman of E.D.A. Council, said that the results achieved in the space available were very creditable indeed, not only to their colleagues in the Association, but to Mr. Hulme Chadwick, who was responsible for the artistic work.

Sir Alfred Hurst, chairman of the Executive Committee of the Centre, said that the exhibition held out hope to the public at large for something it could enjoy in the near future.

Mr. H. T. Young, chairman of the E.D.A. Building Centre Committee, said that Mr. Chadwick had struck a note of gaiety which did not detract from the exhibits. One of the ideas behind the enthusiastic participation of E.D.A. and its staff was to interest the architect in the improvement of design as related to electricity.

Quartz Crystal Calibration

A frequency calibration service for all types and makes of quartz crystal units is now being operated by Salford Electrical Instruments, Ltd., Heywood. This service is limited to the certification of frequency, but an indication of crystal activity is given for a circuit capacity of 30 pF. If specified, frequency and activity can be quoted at alternative circuit capacities of 20 pF or 50 pF, or at series resonance in the case of lower frequency types.

PARLIAMENTARY NEWS

By Our Special Reporter

REPLYING to Mr. Dumpleton in the House of Commons last week the Minister of Fuel and Power said that the available capacity of the stations now controlled by the British Electricity Authority was approximately 9,380,000 kW in January, 1948, and was expected to be approximately 9,707,000 kW in January, 1949. The increase of capacity was less than was estimated in the Economic Survey because more plant—to the extent of some 200,000 kW—would have to be taken out of service for repair and less new plant—to the extent of between 500,000 and 600,000 kW—had been commissioned than was expected.

The British Electricty Authority, he said, had already carried out a full inquiry into the reasons why it had not been possible to bring new plant into commission on the scale contemplated in the Economic Survey. The main explanation was that the estimates in the Survey were too high, in the light of the capacity of the manufacturing industries concerned, their export commitments and shortage of skilled labour and materials. These estimates were made before vesting date and before it was possible to correlate precisely all the necessary information about the progress of work at and for the power stations owned and under construction by the many separate undertakings throughout the country. There were also delays in individual cases where the undertaking concerned altered designs at the last minute, failed to let contracts in time or did not adequately supervise the execution of the contracts. More generally, lack of co-ordination in the placing of orders and absence of standardization, to a large extent inevitable while responsibility was diffused and before it was concentrated in the hands of a single authority, had held up progress.

Mr. Dumpleton asked whether, since the increase in actual capacity had fallen so far short of that estimated for this year in the Economic Survey, the estimated increase of 1,450,000 kW for next year was likely to be reached and whether the figures given for subsequent years were reliable.

Mr. Gaitskell said he was not in a position to give detailed figures for subsequent years. He thought it most unlikely that the figure for 1949 mentioned in the Survey would be attained.

Plant for Russia

Sir Waldron Smithers asked the President of the Board of Trade if, in view of the cuts in electricity supply in Britain, he would stop the export of electrical power plant to the U.S.S.R.

Mr. H. Wilson said that the plant they were now sending to Russia was not of the kind required for the British Electricity Authority's programme.

Consultative Councils

Major Tufton Beamish asked the Minister of Fuel and Power, whether, in view of the fact that it was now ten months since the vesting date, there was any reason for the further postponement of the setting up of the Consultative Councils as laid down in Clause 7 of the Electricity Act, 1947; and on what date these Councils would be formed.

Mr. Gaitskell said he had recently appointed the Consultative Councils for the South-Eastern, South Wales and Yorkshire Electricity areas and he expected that the Councils for the Eastern and South-East Scotland Electricity Areas would be appointed in the next few days. The remainder of the Councils would be appointed very soon, probably before the end of the year.

Christmas Tree Lighting

Mr. Granville asked the Minister of Fuel and Power if it was the intention of his Department to sanction the use of electricity for illuminated Christmas trees in communal public centres during the Christmas period.

Mr. Gaitskell said there was no objection to this.

Cosmic Ray Research

Replying to Mr. Donner, Mr. H. Morrison said that with a view to exploring the ionospheric conditions of the southern hemisphere the D.S.I.R. established an ionospheric station in the Falkland Islands in the middle of 1947. The officer in charge of the station, in company with the Governor of the Falkland Isles, selected a suitable site for the erection of a station in Graham Land.

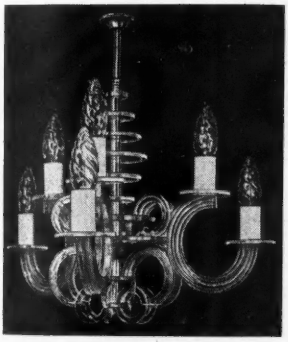
The recommendation of the Committee on Radio and Cosmic Ray Research now stood referred for approval to the appropriate Radio Committee of the D.S.I.R. The Department had meanwhile taken some steps towards establishing a Station in Graham Land as soon as staff and equipment could be sent there.

RECENT INTRODUCTIONS

NOTES ON NEW ELECTRICAL AND ALLIED PRODUCTS

Cluster Chandelier

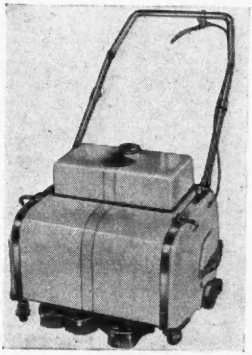
ONE of the first post-war attempts by British manufacturers to produce a cluster chandelier of the Continental type has been made by the EXCHANGE ELECTRICAL CO., 41, Cheetham Hill Road, Manchester, 4, in conjunction with the DEX-RAY ENGINEERING CO., LTD., 4, Brock Street, Manchester, 1. Crystal "Perspex" is used with chromium fittings and standard 25- or 40-W candle lamps. The fitting is completely shadowless and there are over one hundred halos of edge and groove illumination. Wall lamps to match are also available.



Six-light "Perspex" fitting

Floor Scrubber

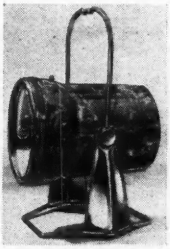
The Morphy-Richards "Simon" electric floor scrubber will, in one operation, scrub, wash, wipe and dry any type of floor surface at the rate of 3,000 sq ft per hour. The machine, which employs scrubbing brushes, detergent in solution and wiping cloths, is a heavy-duty industrial equipment weighing 200lb and measuring approximately 2ft cube. It is powered by a ½ h.p. motor and is self-contained, requiring no auxiliary water tanks or other equipment. The finish is stoved enamel with chrome fittings. The makers are MORPHY-RICHARDS, LTD., St. Mary Cray, Kent.



Industrial floor scrubber

Battery-operated Lantern

A 6 V battery-operated "Drydex" lantern is now being marketed by the CHLORIDE ELECTRICAL STORAGE CO., LTD., Exide Works, Clifton Junction, near Manchester, which is so constructed that whether carried in the hand or stood on the ground a beam can be directed and fixed at any angle. It is robustly made of moulded material and is furnished with an unbreakable lens and a chromium-plated stand and handle.



Drydex lantern

Commercial Vehicle Head Lamp

A flush-fitting head lamp suitable for fully fronted cabs on passenger and commercial vehicles has recently been added to the range of equipment manufactured by SIMMS MOTOR UNITS, LTD., Oak Lane, East Finchley, London, N.2. The beam adjustment is effected by swivelling the lamp body assembly which has a universal movement of up to eight degrees between the fixing flange and clamping ring, so that optimum road illumination is obtained in relation to cab contour. Provision is made for fitting a double filament bulb if required and a three-way terminal block is standard. With the exception of the reflector, the lamp is composed entirely of anodized aluminium die castings and is obtainable with either anodized or chromium plated finish to the bezel and fixing flange.

Simms headlamp type L 91

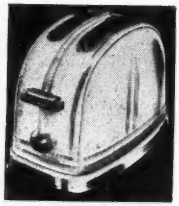
Cooker Control Units

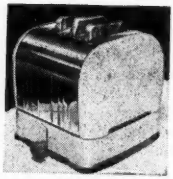
Several improvements have been incorporated in cooker control units produced by ARROW ELECTRIC SWITCHES, LTD., Hanger Lane, Ealing, London, W.5. The exclusive feature of having all component parts mounted in one single porcelain base is be-

ing continued and the unit is housed in an attractive pressed-steel box with domed cover. A choice of units is available consisting of quick make-and-break 30-A double-pole main switch with 5- or 15-A plug socket controlled by a double-pole switch. Units can be supplied with or without pilot lights. Standard finish is white stoved enamel, but other finishes such as cream or pale grey mottled effect can be supplied at no extra cost.

Automatic Toasters

Two large slices of bread are toasted on both sides simultaneously in the new automatic "pop-up" toaster made by KEITH ELECTRICAL INDUSTRIES, LTD., Thorburn Street, Upper Brook Street, Manchester, 13. The action is fully automatic and silent. The bakelite handles are designed for easy lifting, and to be always cool to the touch. A time regulator has a range of from one to three minutes. A hinged tray underneath allows the crumbs to fall out automatically. The toaster, which is in chromium-plated steel, is 11 in by 7½ in by 6⅜ in; it weighs 5½ lb and the loading is 1,200 W.





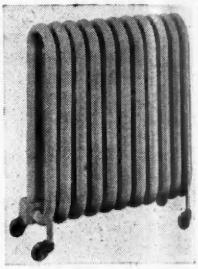
Automatic toasters: Above (left) Keith; above (right) Morphy-Richards; and, right, Dualit

In addition to a multiple-position setting button to regulate toasting, an automatic two-slice electric toaster, introduced by MORPHY-RICHARDS, LTD., St. Mary Cray, incorporates manual contact for inspection during toasting. An air-spaced double crumb-tray is provided beneath. The attractively designed case is chromium-plated, with black mouldings. The loading is 1,200 W.

Toasters which automatically switch on the electricity when the bread is inserted and switch off when the toast is ejected are available from DUALIT METAL & PLASTICS, LTD., Picton Street, Camberwell, London, S.E.5. The domestic type (1,500 W) takes three slices and the commercial model (3,000 W) six, a switch in the latter cutting out half the elements when toasting three slices only. The frame and sides of the toaster are of cream-enamelled aluminium and the cover is of solid chromium-plated brass.

Portable Oil-filled Radiator

A portable oil-filled electric radiator with a humidifier incorporated has been developed by OCEAN HOME APPLIANCES, LTD., 99a, Park Lane, London, W.1. The unit, which is constructed of seamless steel tubes finished in cream enamel, has a large heating surface resulting in a comparatively low maximum surface temperature of approximately 180 deg F. The maximum loading is 1,800 W, controlled either by a three-heat switch or thermostat.



"Ocean" radiator

Centrifugal Switch

With single-phase a.c. motors of the split-phase or capacitor-start type a centrifugal switch is usually fitted, as an integral part of the machine, to disconnect the starting winding when the shaft speed reaches about 80 per cent of the normal running speed. For this purpose, a switch of novel and robust construction which uses the centrifugal force produced on an unbalanced rocking lever, has been developed by TILLING-STEVENS, LTD., Maidstone. The rocking lever is pivoted at its centre, one end carrying a weight for partial balance and the other a platform on which are mounted a steel armature and a contact consisting of a spring skid ending in two arms. The lever, together with a permanent magnet, is mounted on a moulded carrier which in turn is fastened to the motor shaft. Secured to the bearing boss is a slip ring assembly; the rings are separated by a flash guard.

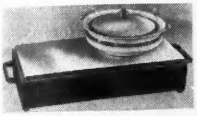
When the motor is not rotating the skid is held in contact with the slip rings by attraction between the magnet and

Rocker arm and magnet assembly of the Tilling-Stevens centrifugal switch in closed position

armature, thus completing the circuit through the starting winding. When the supply is switched on, the starting winding is in circuit and the shaft rotates at an increasing speed until the centrifugal force on the armature overcomes the attraction between it and the magnet. At this instant the armature flies outward and in so doing lifts the skid away from the slip rings, thereby isolating the starting winding. As long as the shaft speed remains high enough for the centrifugal force on the armature to exceed the attraction of the magnet the switch will remain open. It may be noted that in this position the radius of rotation of the armature is increased and that of the balance weight decreased as compared with the closed position. This means that the speed has to fall to a very low value before the switch recloses. It is, therefore, possible for heavy momentary loads to considerably reduce the speed without the switch reclosing and hunting occurring.

Warming Plate

The ARORA CO., Rosebery Street, Loughborough, has redesigned its domestic type warming plate. Loaded at 150 W, the apparatus is attractively finished, having a ripple black enamel body with dull chromium-plated top. The dimensions are approximately 18 in by 9 in by 4 in.



Arora warming plate

Food Mixer

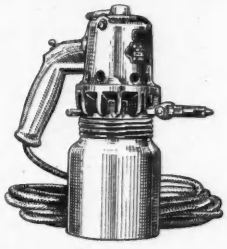
A compact food mixer (only 8½ in high), with four speeds, is now available from G. T. WESTON, LTD., 130, Vaughan Road, Harrow. The revolving bowl, which has a capacity of 2½ quarts, is on a ball-bearing turntable. The apparatus is finished in cream enamel, with polished fittings and moulded switch knobs. It weighs 13 lb.

Heavy Duty Fast Charger

The fast charger, which is now being made by CRYPTON EQUIPMENT, LTD., Bridgwater, Somerset, is unobtrusive in appearance and intended for charging heavy duty lead-acid batteries of the type used in buses. It has a 100-A output for fast charging and is adjustable for any lower output which may be needed. Both 12 and 24 V batteries can be charged in the vehicle in from 0.5 to 1.5 hours. Means are provided for showing the condition of each cell and whether the battery can be fast charged, requires a slow restoring charge, or is defective and needs service or replacement. The condition of batteries is also indicated during the charging process by a check of the "on-charge" voltage and the charging rate.

Sprayer

The "Mistmaster" electric sprayer is supplied by JEYES' SANITARY COMPOUNDS CO., LTD., Millbrook, Chigwell, Essex, for use with insecticides, disinfectants, etc. Its ⅛-h.p. universal motor gives a powerful spray penetrating all cracks and crevices over a wide area, while one filling lasts 45 minutes. A finely bored adjustable nozzle enables spraying to be carried out at any angle between floor and ceiling.



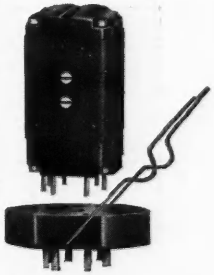
"Mistmaster" sprayer

Plastic Heating Pad

Claimed to be the largest single-heat model on the market, the "TBP/1" heating pad made by THERMOELECTRICS, LTD., Chapel Works, Church Street, Hampton-on-Thames, measures 21 in by 15 in with a loading of 40 W it operates at 140 deg F. It has an attractive plastic covering and is supplied with 2 yd of flex.

Miniature Relay

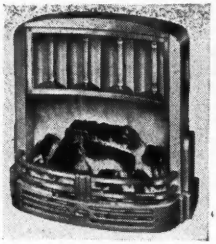
A miniature permanent-magnet moving-coil switching relay which is furnished with a plug-in base for either chassis or panel mounting is now available from SANGAMO WESTON, LTD., Enfield, Middlesex. The coil is rated at approximately 1.5 mW and can be expected to give a repetitive accuracy of about ± 10 per cent. An alternative model is available, which will operate on a power input as low as 1μW, but it is not guaranteed to operate at less than the specified current and needs to be balanced for the position in which it will be used. These relays weigh only 1.75 oz and occupy 1.5 by 0.625 in of chassis space.



Sangamo Weston S 115 miniature relay

Improved Electric Fire

Attractively modern in design, the latest design of electric fire by BERRY'S ELECTRIC, LTD., Touchbutton House, Newman Street, London, W.1, has a heating element assembly which ensures a very wide angle of radiation, and the four 500-W elements are controlled by two recessed switches. The fire effect of this No. 444 model



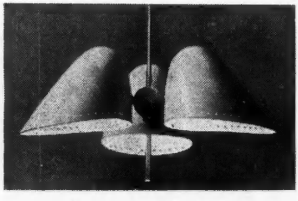
"Masterberry" fire

"Masterberry" is unusually large and cheering, and its glow has been echoed in the tint of the metalwork—warm silver, a new finish. The element assembly and the front bars are polished. The "Masterberry" can also be supplied in glossy black with polished parts as above.

Adjustable Lighting Fittings

The "Versalite" series of adjustable lighting fittings designed by Mr. A. B. Read for TROUGHTON & YOUNG (LIGHTING), LTD., 143, Knightsbridge, London, S.W.1, were introduced to the public for the first time at the recent Design at Work Exhibition at Burlington House, London. Incorporating aluminium reflectors and simple metal supports, these units are interchangeable and are capable of being varied in many ways by differences of surface finish or material. The standard finishes for the metalwork are satin brass or satin chromium plate with the reflectors sprayed ivory white. The shades are available in various plastic materials.

Reflectors and shades may be turned through 360 deg round the lampholders, and a halved friction joint or a ball socket

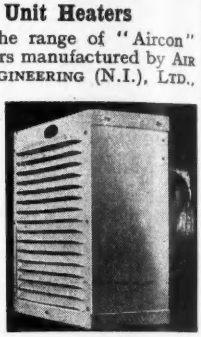


Pendant form of "Versalite" fittings

allows the light to be directed at any angle. Pendants and brackets are reversible to provide direct or indirect lighting, and the series includes an extending arm wall bracket which allows the lamp to be moved horizontally in a radius of 2ft from the point of fixing to the wall. The floor standard is light; the shade is movable for directional light and the tubular arm holding it may be raised or lowered 18in vertically.

Industrial Unit Heaters

An addition to the range of "Aircon" industrial unit heaters manufactured by AIR CONDITIONING & ENGINEERING (N.I.), LTD., 3, Bayley Street, Tottenham Court Road, London, W.C.1, while retaining the essentials of the earlier models embodies additional features to increase the efficiency of opera-



"Aircon" industrial unit heater

tion. Three sizes are available; 2, 4 and 6 kW, the latter being suitable for connection to either single or three-phase supplies.

Medical Lamps

The versatile "Beach" quartz sun lamp made by the LUMSDEN LAMP CO., Millburn, Almondbank, Perth, is suitable for use in small clinics or in the home. The anodized aluminium reflector is adjustable for vertical

The Lumsden "Beach" sun lamp

or horizontal use. Infra-red lamps fitted with 9 in tubular 400 W emitters in wide-angle chromium-plated reflectors are available in floor, table or mobile models. The floor models have telescopic stands.

Car Heaters

Two car heaters will shortly become available from H. M. BIRCHALL, 3, Moreton Terrace, Great Moreton, near Congleton, Lancs. One is a personal heater in the form of an aluminium tube which is arranged for operation on a 12-V automobile electrical circuit with a rating of 30 W. The other is a car radiator heater, also of aluminium construction, for mains operation.

Reports and Dividends

The Jerusalem Electric & Public Service Corporation, Ltd.—The annual meeting of the company will be held on 29th December, and in a statement circulated to shareholders Mr. W. Shearer (chairman) says that owing to the abnormal circumstances existing in Jerusalem, it has been impossible to complete the preparation and audit of the accounts for the year ended 31st March last in time for submission to the meeting. An adjourned meeting will therefore be held as early as possible in 1949 for this purpose.

Referring to bulk supplies from the Palestine Electric Corporation, Ltd., Mr. Shearer says that owing to rioting and the general deterioration of conditions in the country, the Palestine Corporation has found it impossible to complete the connecting line. Despite the loss of this anticipated bulk supply, load-shedding has been negligible, and a record peak load of 9,910 kW was carried by the system during March, 1948. Costs have risen very considerably, and although there have been small increases in tariffs, preliminary figures indicate that the net profits for the year under review are somewhat less than for the preceding year. Owing to damage to the distribution network, supply to the Old City, Bethlehem and Ramallah has been suspended since May, 1948, and large areas of the New City have been evacuated, resulting in considerably reduced demand. The expansion which has taken place since 1937 has been financed from surplus revenue and from bank advances, and the result has been a heavy drain on the liquid resources of the Corporation. In view of this and of the continued troubles in Jerusalem, the directors are unable to recommend payment of a dividend on the ordinary shares for the year ended 31st March last, and for the same reason, payment of the dividend on the cumulative preference shares for the half-year ended 30th September last, has been deferred.

J. & F. Stone Lighting & Radio, Ltd.—In his statement, issued with the report and accounts, Mr. N. W. Wild (chairman) says that although sales of the group for the year under review increased by more than 15 per cent, the trading profit decreased by £27,750. This was due to reductions in rates of purchase tax on certain goods, which had to be borne by the companies concerned, difficult trading conditions experienced by the manufacturing subsidiary company, and the substantial increase in hire-purchase agreements, on which the full profit will not be realized until the agreements mature. The sales since the close of the financial year have been substantially maintained. There is at present an increasing tendency on the part of the public to acquire goods under the hire-purchase system, and sales of the group under this system continue to increase.

Crompton Parkinson, Ltd., in a preliminary statement, report a net profit for the year ended 30th September last of £522,065, as compared with £450,895 for the preceding year. It is proposed to pay a final dividend on the ordinary and "A" ordinary stock and the "A" ordinary shares of 7½ per cent, actual, plus a cash bonus of 7½ per cent, making a total distribution for the year of 22½ per cent (unchanged). At 30th September certain moneys were still outstanding in connection with the new issue and accordingly the "A" ordinary shares in question had not been converted into "A" ordinary stock at that date. It is proposed to pay a sum of £5,000 to the trustees of the Central Benevolent Fund. After adding £596,952, being provisions no longer required and profits relating to previous periods, the balance carried forward is £1,656,506 (against £916,297 brought in).

The British Electric Transformer Co., Ltd., reports a profit of £86,318 for the year ended 30th September last, as compared with £79,729 for the previous year. It is proposed to pay a dividend for the year on the ordinary shares of 3s 10d per share, and in addition to pay a special dividend of 1s 2d per share, free of tax, payable out of provisions at 30th September, 1947, amounting to £23,539 not now required. The balance carried forward is £961 (against £635 brought in).

Crabtree Electrical Industries, Ltd., reports a consolidated trading profit, with other receipts, of £283,826 for the nine months ended 31st July last, and a net profit of £136,875. The trading profit of J. A. Crabtree & Co., for the year to 31st July last, amounted to £282,807 (against £239,372 for the preceding year), and net profit to £139,542 (against £111,630). It is proposed to pay a final dividend of 7½ per cent, less tax, making 17½ per cent for the nine months. This compares with a distribution of 17½ per cent for the previous year.

The Perak River Hydro-Electric Power Co., Ltd., reports a net revenue for the year ended 31st July last of £454,223 as compared with £228,743 for the preceding year. After providing for depreciation, de-

benture interest, income tax, etc., and placing £66,000 to contingency reserve, there is a balance of £145,347 (against £9,244). From this is deducted a debit balance brought in of £82,236 and further provision for past taxation £60,076, leaving a credit balance of £3,035 to be carried forward. The report states that further progress has been made in the rehabilitation of the system. In view of increasing demands the necessity for augmenting the output is constantly under consideration.

The Sun Electrical Co., Ltd., reports a trading profit, etc., for the year ended 30th April last of £114,094, compared with £74,674 for the preceding year, and a net profit of £41,482 (against £22,486). After allocating a further £12,500 for income tax on profits to 30th April, 1947, and placing £11,500 to reserve, the ordinary dividend for the year is again 7½ per cent, and the balance carried forward is £16,602 (against £8,125 brought in).

In his statement, Mr. A. G. Beaver (chairman) says that increased rates of purchase tax on many appliances sold by the company have had the effect during the current year of diminishing public demand. Some of the ground lost at the beginning of the current year has been made up in recent weeks because of the increased selling effort which the company has been able to make. It is not anticipated that the company will be able to achieve the same high level of turnover in the current year if the excessive rates of purchase tax continue. Sales of installation supplies and industrial products, however, show a small increase so far.

Lisbon Electric Tramways, Ltd., is again paying an interim dividend of 2½ per cent, tax free.

British Insulated Callender's Cables, Ltd., is paying an unchanged interim dividend of 2 per cent.

New Companies

J. Harrison (Hawkhurst), Ltd.—Registered 29th November. Capital, £500. To acquire the business of an electrician carried on by J. Harrison at Hawkhurst. Directors: C. T. Kibblewhite and J. Harrison. Secretary: A. F. Sadler. Regd. office: Tudor Hall, Hawkhurst, Kent.

Deodazone, Ltd. — Registered 12th November. Capital, £1,000. Designers, manufacturers, importers and exporters of, and dealers in, ozone generators, electrical and mechanical disinfestors, electrical accessories and components, etc. Directors: A. Green and F. C. Ward. Regd. office: Sydenham House, 23, Eaton Road, Coventry.

Woodcraft (Electrical), Ltd.—Registered 13th November. Capital, £1,000. Electrical contractors, and electrical wiring and installation specialists, etc. Subscribers: E. J. Woodcraft and J. W. Cockram. Regd. office: 21 Cardiff Road, Luton.

Fluorescent Rentals, Ltd.—Registered 8th December. Capital, £100. Electricians. Directors: A. R. Moore, director of Beam (Electronic Engineers), Ltd., and P. H. Fitzgerald. Sec.: A. R. Moore. Regd. office: 233-235, Lewisham High Street, S.E.

Liquidations

British G.W.Z Battery Co. (1939), Ltd.; Ever Ready Electric Bulb Co., Ltd.; Vulco Dry Battery Co., Ltd.; Grosvenor Electric Batteries, Ltd.; Hellesens, Ltd.; Vee Cee Dry Cell Co. (1927), Ltd.; White Metals, Ltd.; Vince's Dry Batteries, Ltd.—Members' voluntary winding-up. Liquidator, Mr. B. G. Phelvin, 4, Hercules Place, Holloway, London, N.7.

Rex Radio, Ltd.—Members' voluntary winding-up. Liquidator, Mr. J. B. Humphreys, 5, John Dalton Street, Manchester. Particulars of claims to the liquidator by 31st December. This notice is purely formal. All creditors have been or will be paid in full.

Globelite Batteries, Ltd.—Meeting of members on 31st December at Parliament Mansions, Victoria Street, London, S.W.1, to receive an account of the winding-up by the joint liquidators, Messrs. J. J. Davis and A. F. Norman.

"Ceag" Electric Safety Lamp Co., Ltd.—Members' voluntary winding-up. Meeting of members on 7th January at 2, Darley Street, Bradford, to receive an account of the winding-up by the liquidator, Mr. G. W. Roberts.

Bankruptcies

G. Clegg, residing at 14, Temple Square, Cheetham, Manchester, and formerly carrying on business at 250, Cheetham Hill Road, Manchester, under the style of George Arthur Clegg, electrical contractor. —Receiving order made 7th December, 1948, on debtor's own petition.

N. A. M. Settle, lately residing at 142, St. George's Road, Bolton, Lancs, electrical engineer. —Trustee, Mr. A. T. Eaves, 47, Mosley Street, Manchester, 2, appointed 4th December, 1948.

W. E. Holloway, residing at "Riverview," Burton Road, Ness Holt, Wirral, Ches, and trading as Dominion Electric Heating Co. at 23, Market Street, Birkenhead, electrical contractor. — Receiving order made 1st December, 1948, on debtor's own petition. First meeting held 14th December. Public examination 25th January at the Court House, Pilgrim Street, Birkenhead.

STOCKS and SHARES

IN every market of the Stock Exchange, with the solitary exception of the gilt-edged, the complaint "Nothing doing" is heard. The season of the year, the claims of the tax-collector, the unquenchable spirit of "window-dressing" are amongst the reasons for the lack of interest shown by the public in stocks and shares. The gilt-edged market maintains a reasonably fair front, its prices sustained as a whole by the steady influx of money into British Government securities, among which Transport Threes at 99⅛ and Electricity Threes at 102½ continue to be popular.

Budget Possibilities

After the turn of the year, it is known that substantial new issues will make their appearance, and it may be that a certain amount of capital is being held back for this reason. Already speculation begins to toy with possibilities inherent in the next Budget. If material remission of taxation is not generally expected, it is nevertheless thought that there may be relaxation in the present restrictions laid upon the issue of bonus shares, or of shares on bonus terms.

The outstanding features of the industrial market are the comparative firmness of prices in the face of languid interest on the part of the public, and, secondly, the favourable reception accorded in most cases to new issues of capital now being made.

Price Changes on the Week

British Electric Traction deferred is beginning to slip back, and at 1,900 is 25 points down on the week. Thomas Tilling have declined a few pence to 120s 6d. Reyrolle at 61s 3d, Oriental Telephone at 50s, and Madras Electric at 36s 3d all show ⅛ loss. Rises include E.M.I. 21s, Greenwood & Batley 53s 3d, Telegraph Construction 48s 6d and British Vacuum 13s 9d. Cable & Wireless are rather better on the week, the preference at 124½ and the ordinary at 208½.

As a result of the proposed deal between Brush Electrical and Associated British Engineering, the latter's £1 shares took a spectacular leap from 41s to 65s. Brush rose initially to 7s 9d but reacted to 6s 9d.

Cromptons and Crabtrees

Crompton Parkinson's profits statement in support of the final dividend announcement mentions only the parent's net figure for the year. Disclosure of the group's experience as a whole waits on the appearance of the full report. Meanwhile, satisfaction is expressed with the £71,000 increase in the preliminary figure, which has risen to £522,000; the improvement covers easily the extra amount required to pay the final dividend and bonus on the million new shares issued last May. These missed the 7½ per cent interim, but qualify for the two current payments at the same rate.

Crabtree Electrical's final dividend again makes 17½ per cent for the year. It relates to a nine-month period, but covers a full year's trading by J. A. Crabtree, the operating subsidiary. Profits have again increased. Crompton's 5s shares at 27s 9d and Crabtree's 10s shares at 43s, yield a shade over 4 per cent in each case.

Plessey Report

The Plessey Company's consolidated accounts and balance sheets, together with the tenor of the accompanying chairman's review, have left a good impression on market opinion, but little on the price of the 5s ordinary shares. These remain at 17s 6d, showing a yield of 5¼ per cent on the 20 per cent dividend. This year's group profits of £65,000, after all charges, go far to restore the position as it was before the 1946/7 results, which made a conspicuous exception to the consistently high level of earlier profits. The latest figures represent earnings of about 30 per cent on the £250,000 ordinary capital. In front of this comes an equal amount of 5½ per cent preference, and the £710,000 in 4½ per cent second preference shares issued last year. These are quoted at 27s 6d and 18s 9d respectively, and are together covered some 2½ times by net earnings.

Overseas Electricity

Jerusalem Electric have circulated a copy of the chairman's statement to be made at the coming meeting. Mr. Shearer gives a full account of the circumstances which compel the passing of current dividends on the ordinary and preference shares. These remain at about their lowest prices of the year, namely, 16s 3d and 18s 9d. Understandably, the chairman does not commit himself on the subject of early prospects. Calcutta Electric ordinary, which were carried above £3 last year, on the strength of take-over possibilities, have found a level at around 33s since the removal of that uncertainty. On the regular 6 per cent tax-free dividends, they return over 6½ per cent gross. Last May, the company took powers to issue fresh capital on a scale commensurate with the heavy projected expenditure on plant and extensions. The £1 shares of Calcutta Tramways, which held their annual meeting last week, have risen 2s to 31s 6d. No dividend has been paid for two years, but the chairman mentions the possibility of an early interim payment.

Trade with Portugal

GREAT BRITAIN'S SHARE OF ELECTRICAL MARKET

As a result of official discussions, future trade between Portugal and the United Kingdom is expected to reach a higher level than was anticipated at the end of last year. There is good reason to suppose that Portugal will be ready to take increased quantities of British electrical goods, for which already she is a leading customer. She would welcome the rapid fulfilment of her plans for hydro-electric development. Consumption of electricity in Portugal has been increasing steadily, while from time to time drought has interfered with the output of hydro-electric power, thus necessitating greater use of coal which is difficult and costly to obtain.

The accompanying table shows the values of Portuguese imports last year of the principal groups of electrical manufactures, together with notes of changes compared with 1946. It will be seen that increases took place throughout, the only noteworthy exception being certain kinds of wire and cable. Imports of power plant and accumulators doubled and those of radio goods more than doubled in value. Much of the additional trade during the year went to the United Kingdom and United States. (100 escudos = £.)

Sources of Imports	1947 Escudos (000)	Inc. or dec. on 1946 Escudos (000)
Accumulators and condensers weighing per cell less than 8 kg.	10,684	+ 5,795
From United States	6,590	+ 4,157
,, *Spain*	425	− 349
,, *Switzerland*	116	− 100
,, *Britain*	2,476	+ 1,521
Other accumulators, condensers and parts	5,419	+ 2,393
From Spain	531	− 203
,, *Switzerland*	124	− 120
,, *Britain*	1,536	+ 444
,, *United States*	2,344	+ 1,543
Batteries, dry	2,784	+ 1,137
From United States	1,242	+ 662
,, *Britain*	599	+ 100
,, *Switzerland*	170	− 155
Batteries, other	46	− 18
From Britain	37	− 17
Loudspeakers	3,008	+ 1,070
From United States	2,297	+ 1,522
,, *Sweden*	91	− 57
,, *Holland*	108	− 110
Radio receiving apparatus	65,597	+ 36,332
From United States	36,145	+ 27,097
,, *Sweden*	4,208	+ 894
,, *Switzerland*	370	+ 65
,, *Holland*	11,308	− 1,072
,, *Britain*	8,294	+ 4,436
Telephone apparatus	11,266	+ 1,004
From United States	1,381	+ 916
,, *Britain*	7,299	+ 1,420
,, *Sweden*	1,820	− 1,771
Generators, motors, transformers and parts weighing up to 100 kg.	50,273	+ 26,615
From United States	13,551	+ 8,257
,, *Holland*	3,106	+ 931
,, *Switzerland*	8,273	+ 1,522
,, *Sweden*	2,000	+ 477
,, *Britain*	12,429	+ 5,489
Ditto weighing 100 to 500 kg.	18,626	+ 7,675
From United States	2,826	+ 1,425
,, *Britain*	1,350	− 1,878
,, *Sweden*	221	− 678
,, *Switzerland*	1,263	− 1,790
Complete installations for telephone exchanges (excluding telephones, accumulators and dynamos)	36,183	+ 13,567
From Britain	20,284	+ 9,757
,, *Sweden*	15,474	+ 5,628
Lamps for lighting or heating	12,776	+ 3,944
From United States	4,335	+ 3,173
,, *Holland*	6,481	+ 753
,, *Britain*	510	− 321
Lamps, other electric	10,297	+ 4,724
From United States	8,085	+ 4,955
,, *Britain*	600	− 248
,, *Holland*	682	− 465
Vacuum cleaners	4,469	+ 2,144
From Sweden	2,646	+ 1,001
,, *Britain*	755	+ 404
Insulating materials and porcelain insulators	17,821	+ 8,958
From United States	5,801	+ 3,436
,, *Britain*	3,552	+ 1,317
,, *Sweden*	910	− 477
,, *Switzerland*	4,110	+ 1,869
Insulated wire or cable, textile-covered, weighing up to 120 grammes per metre	4,665	+ 948
From United States	776	+ 288
,, *Britain*	2,342	+ 327
,, *Sweden*	322	+ 204
Ditto weighing over 120 grammes per metre	15,224	+ 7,200
From Britain	10,356	+ 4,223
Ditto with other insulation and Metal-protected	20,356	− 16,000
From Britain	11,877	− 19,827
,, *United States*	1,012	+ 349

Scottish Industries Exhibition

The Scottish Industries Exhibition will be held in the Kelvin Hall, Glasgow, from 1st to 17th September, 1949. Applications for space and other inquiries should be sent to the manager, Mr. R. M. Donaldson, at 351, Sauchiehall Street, Glasgow.

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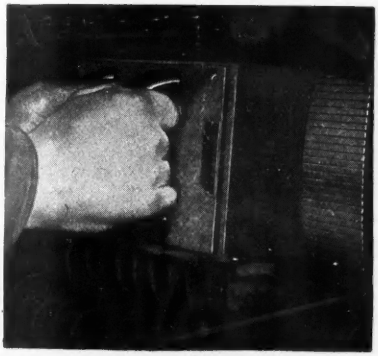

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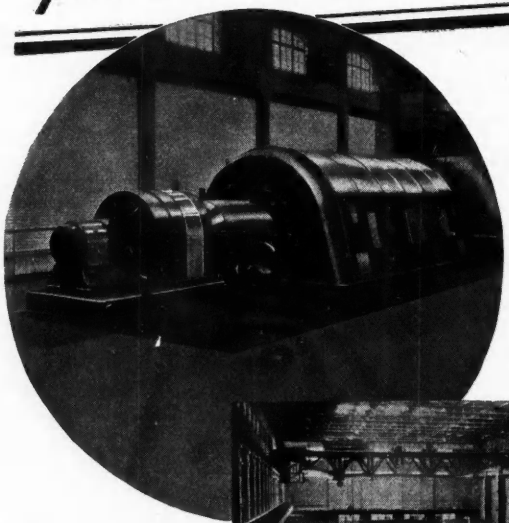

Left: 50,000-kW Metrovick turbo-generator installed, with condensing plant, at the Neepsend station (Sheffield). A duplicate set is being built.

Right: Interior of the Portishead Generating Station (Bristol), containing three 51,250-kW and two 20,625-kW Metrovick turbo-generators and condensing plant.

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Electricity Supply

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Alnwick. — RURAL EXTENSIONS. — The Rural District Council has approved plans submitted by the North-Eastern Electricity Board for supplying electricity to the Denwick-South Charlton area; Low Hedgeley Farm; Rock Hall; Togston Barns; Hulne Park Saw Mill; a new housing estate at Boulmer; Silvermoor and Denwick Lane Farms; Denwick Village; and a new substation at North Hauxley.

Bolton.—SODIUM LIGHTING.—Subject to the consent of the Ministry of Transport, blended sodium lighting is to be installed along Churchgate and ordinary sodium lighting along a number of other roads.

Bromley (Kent).—ANNUAL ACCOUNTS.—A surplus of £630 is shown in the accounts of the former Council electricity undertaking for 1947-48. Revenue increased by £504 to £206,252, while working costs (£178,809) were up by £16,513. There was a small decrease in sales, which totalled 27.6 million kWh. The average price received per kWh sold was 1.68d (against 1.66d in 1946-47).

Durham.—SCHOOL INSTALLATIONS.—The Ministry of Education has sanctioned the installation of electricity at Crook County Boys' School, East Hedley Hope County School and the Fir Tree County School.

Gateshead.—HIGHER COST OF LIGHTING CONVERSION.—Owing to certain modifications and increased costs of labour and materials, the first stage of the Council's street lighting electrification scheme is expected to cost £17,055 against the original estimate of £15,000. The Council has approved a £2,132 scheme for the installation of a central control unit covering the whole of the lighting area.

Market Harborough. — ESTATE LIGHTING.—The U.D.C. is to install electric street lighting on the new Southern Estate.

Middlesex.—SCHOOL PLANS.—The County Council is recommended to authorize the county architect to arrange for the installation of fluorescent lighting in the science, geography and head teacher's rooms at the Potters Bar (Parkfield) County Secondary School at an estimated cost of £320. It is proposed to install electric lighting at the Southgate (Hazelwood Lane) Primary School (estimated cost £984), stage lighting at the Enfield (Albany) Secondary Modern School (£256), and to improve the lighting in the art and woodwork rooms at the Wembley (Preston Manor) County School (£245).

Newcastle-on-Tyne. — SCHOOL INSTALLATIONS.—The Education Committee has included in its estimates for 1949 the sum of £11,000 for electrical improvements at schools.

Scotland. — ELECTRIC COOKING. — Mr. G. D. Banks, assistant information officer of the North of Scotland Hydro-Electric Board, addressing the Highland Development League at Glasgow, said that already in some parts of the Highlands about 40 per cent of the consumers were cooking by electricity—more than in cities like London.

South Shields.—PUBLIC LIGHTING.—The Town Council is to enter into a new agreement on street lighting with the North-Eastern Electricity Board on the basis that the Board will be responsible for supplying electricity to the lighting points and the Council will take over responsibility for the erection, maintenance and lighting of the lamps.

Tayport.—NEW LIGHTING INAUGURATED.—When he switched on the burgh's new electric street lighting recently Provost Barron said that because of protracted negotiations with Government Departments it had taken exactly two years to get the modified installation. Only one month, however, had elapsed since the work was really begun, and he congratulated the Metropolitan-Vickers Electrical Co., Ltd., on the expeditiousness with which the installation was carried out.

Wallsend.—HIGH-VOLTAGE EXTENSION.—The North-Eastern Electricity Board is to construct a 66-kV extension (partly underground) from Carville power station to the Rising Sun Colliery. It is also proposed to construct an overhead line from the colliery northwards into the Longbenton urban area.

ESTATE LIGHTING.—The Town Council has applied to the Ministry of Transport for sanction to provide street lighting on the Churchill Street, Westmorland, West Farm, and Willington West Farm housing estates. It is proposed to install 98 electric lamps at a cost to the Corporation of about £2,400.

Overseas

Australia.—SNOWY RIVER PROJECT.—Plans for a scheme costing at least £A166 million for diverting the waters of the Snowy River for hydro-electric power are contained in a report by an investigating committee comprising Commonwealth and State officers. New South Wales and Vic-

torian experts have submitted alternative plans, the N.S.W. scheme being on a more ambitious scale. The Snowy River rises in the Australian Alps and flows southward into Victoria. For years different projects have been made for harnessing the huge power available in the swift-running river, which floods regularly but never dries up. —*Reuters Trade Service.*

Spain.—ELECTRICITY SHORTAGE.—It is reported that a prolonged drought has caused a serious shortage of electricity. Supplies for industrial and domestic uses have already been considerably reduced and even more drastic cuts are probable.

Electricity in Queensland

State-wide Expansion Planned

SINCE 1938 the number of consumers served by the State Electricity Commission of Queensland has risen from 149,191 to 205,333; sales of electricity from 192.2 million to 424.7 million kWh; and the average annual consumption per consumer from 1,228 to 2,068 kWh. A £14 million programme is at present in hand and Mr. S. F.. Cochran, Commissioner, says that in the availability of the necessary equipment and materials lies the key to a very rapid electrical advance in the State. So far it has not been necessary to restrict sales, but there is a danger that some degree of rationing will be necessary if supplies of steel, insulators, transformers, etc., do not markedly improve.

Structural steelwork, not plant from overseas, is the main factor delaying completion of three new power stations (Wide Bay, Capricornia and Townsville) planned for simultaneous construction. The plant for these stations is arriving, states the report, and is being placed in store because the buildings are not ready. The Regional Boards are in consequence being involved in heavy expenditure for storage and capital charges on non-revenue-earning plant. With regard to transmission and distribution, probably the two most difficult items are insulators and transformers. Orders for some types of the former are seldom fulfilled within two years from Australian sources, and Australian-made transformers are being offered on four to five years delivery. Orders have been placed overseas for many items, generally with the object of supplementing supplies from Australian manufacturers. In most cases the cost is said to be considerably greater, but purchase is justified by the desire to carry out development with the least possible delay.

An appendix shows that plant aggregating 37,942 kW has been recently installed in different parts of the State; 162,955 kW has been ordered and 122,050 kW has been recommended for ordering or is under consideration. These figures include two new power stations to be built in Brisbane, one (Tennyson) for the City Council and the other (Bulimba "B") for the City Electric Light Co. A hydro-electric scheme of considerable magnitude has been under investigation for some time at Tully Falls. This, the Commission feels, should be regarded as a national work assisted by Commonwealth as well as State subsidies, on which basis it would be an economic proposition and would contribute greatly to the development of the northern area.

From 1st July, 1948, by an amending Act, the constitution of the Commission has been altered and in place of a chairman and part-time Commissioners it is now controlled by a Commissioner of Electricity Supply. In addition, the Commission has been empowered to deal in electrical equipment and appliances on behalf of the electric supply authorities.

Extensions at Greenwich

FOR some years London Transport's generating station at Greenwich has been in course of reconstruction and enlargement. A stage further has now been reached with the commencement of work on the erection of another 20,000 kW turbo-alternator set to work on 50 c/s which it is hoped will come into service next summer.

When the London Passenger Transport Board took over the station from the London County Council in 1933, all the machines supplying the former L.C.C. trams were designed to generate at 25 c/s. A programme was embarked upon before the war to equip the station with seven 20,000 kW sets operating at 50 c/s. Three are already in service at the new frequency and three others of similar capacity are working on 25 c/s.

Electricity Output

THE weekly return issued by the Ministry of Fuel and Power indicates that the output of solid-fuel fired stations in the week ended 3rd December was 989.1 million kWh, against 928.2 million in the preceding week and 992.2 million in the week ended 5th December, 1947. In the first 48 weeks of 1948 the total output has amounted to 38,422.7 million kWh compared with 35,282.3 million in the corresponding period of last year, an increase of 8.8 per cent. Stocks of coal at electricity undertakings at 4th December totalled 4,265,300 tons, a decrease of 130,700 tons compared with the previous week.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1943

SPERRY Gyroscope Co., Inc.—"High-frequency electron discharge tube structures." 14382. 18th June, 1942. (613411.)

1944

British Thomson-Houston Co. ,Ltd.—"Magnetrons." 5047. 20th March. 1943. (613104.)

Marconi's Wireless Telegraph Co. Ltd.—"Cathode-ray apparatus for portraying intelligence." 6781. 20th November, 1942. (613105.)

British Thomson-Houston Co., Ltd.—"Means for orienting irregular quartz crystals." 10749. 5th June, 1943. (613107.)

A. H. W. Beck and C. S. Wright.—"Electron-discharge devices." 12027. 23rd June, 1944. (613412.)

J. Compton Organ Co., Ltd., and L. E. A. Bourn.—"Electrical musical instruments." 23207. 22nd Nevember, 1944. (613414.)

General Electric Co., Ltd., E. H. Croft and J. C. Turrall.—"Electric motor control systems including speed-limiting devices." 24169. 4th December, 1944. (613415.)

1945

J. Compton Organ Co., Ltd., and L. E. A. Bourn.—"Electrical musical instruments." 1160. 15th January, 1945. (613416.)

Teletype Corporation.—"Telegraph transmitters." 1197. 20th December, 1943. (613417.)

H. Rowe & Co., Proprietary, Ltd., and H. G. Craig.—"Multiple electric switches." 3515. 12th February, 1945. (613418.)

Arc Manufacturing Co., Ltd., E. G. Autie and M. R. Moritz.—"Apparatus and method for heating work by the use of high-frequency electrical energy." 6907. 19th March, 1945. (613419.)

C. W. Berthiez.—"Remote control device for the control of electrically driven machines." 12030. 15th December, 1943. (613421.)

British Thomson-Houston Co., Ltd.—"Magnetrons." 13376. 29th May, 1944. (613423.)

Brush Development Co.—"Magnetic recording and reproducing apparatus." 21542. 22nd August, 1944. (613114.)

Steatite & Porcelain Products, Ltd., Dubilier Condenser Co.(1925), Ltd., E. A. Murray and P. R. Coursey.—"Electric temperature-responsive devices." 25273. 28th September, 1945. (Cognate application 30965/46.) (613116.)

Soc. Anon. de Télécommunications.—"Device for transforming direct-current telegraphic signals into alternating-current signals." 29587. 5th January, 1943. (613431.)

Naamlooze Vennootschap Fabriek van Electrische Apparaten Voorheen F. Hazemeijer & Co.—"Enclosed electric switchgear." 30730. 2nd November, 1942. (Addition to 611229.) (613433.)

Standard Telephones & Cables, Ltd.—"Method and apparatus for manufacturing piezo-electric crystal elements." 34760. 26th December, 1944. (613122.)

Telephone Manufacturing Co., Ltd., S. J. Smith and R. St. G. Terry.—"Timing apparatus." 35254. 31st December, 1945. (613123.)

1946

Marconi's Wireless Telegraph Co., Ltd.—"Mercury-arc rectifiers and like mercury-cathode devices." 621. 4th November, 1944. (613441.)

Sangamo Weston, Ltd.—"Automatic regulation of a.c. generators." 735. 20th January, 1945. (613442.)

Metropolitan-Vickers Electrical Co., Ltd., and W. G. C. Vance.—"Jack or actuator systems." 2718. 28th January, 1946. (613129.)

General Cable Corporation.—"Packaging of wire in coils." 4362. 24th February, 1945. (613447.)

Standard Telephones & Cables, Ltd., and L. G. Davis.—"Telegraph transmitters." 5081. 18th February, 1946. (613137.)

W. T. Henley's Telegraph Works Co., Ltd., G. N. Brett and E. A. Smith.—"Cold-cathode electronic-discharge devices." 5399. 21st February, 1946. (613449.)

R. C. Vaughan and T. F. Slann.—"Miniature electric motors." 5831. 25th February, 1946. (613451.)

Marconi's Wireless Telegraph Co., Ltd.—"Radio direction-finders." 6185. 1st July, 1942. (613452.)

Bendix Aviation Corporation.—"Variable-gain amplifier." 6894. 12th March, 1945. (613141.)

Sperry Gyroscope Co., Inc.—"Automatic gain-control systems for modulated carrier-wave receivers." 7000. 6th March, 1945. (613454.)

Philips Lamps, Ltd.—"Thermionic oscillators. 8116. 2nd August, 1941. (613456.)

Standard Telephones & Cables, Ltd., and E. O. Willoughby.—"Radio-receiving systems." 8182. 15th March, 1946. (613143.)

Philips Lamps, Ltd.—"Electric-discharge tubes." 8417. 14th August, 1941. (613145.)

C.A.V., Ltd., and W. A. Bevis.—"Automatic electromagnetic cut-outs for dynamo-battery circuits." 10200. 2nd April, 1946. (613464.)

J. S. Shayler and J. Buckingham.—"Electrical delay-circuits." 11435. 13th April, 1946. (613466.)

Philips Lamps, Ltd.—"Band-spread tuning devices for radio apparatus." 11782. 1st July, 1941. (613152.)

British Thomson-Houston Co., Ltd.—"Synchronous motors. 15829. 25th May, 1945. (613479.)

Philips Lamps, Ltd.—"Electrically resonant cavities." 16543. 26th March, 1942. (613479.)

Ashley Accessories, Ltd. and R. M. Millican.—"Electrical connectors." 17025. 5th June, 1946. (613209.)

British Thomson-Houston Co., Ltd.—"Frequency variation response apparatus." 17101. 8th June, 1945. (613212.)

S. G. Dehn (Collins Radio Co.).—"Radio transmitting/receiving system." 17231. 6th June, 1946. (613217.)

Standard Telephones & Cables, Ltd.—"High-voltage cable." 17267. 14th June, 1945. (613220.)

Philips Lamps, Ltd.—"Application of metallic coatings to non-metallic surfaces." 17288. 23rd May, 1942. (613222.)

Donovan Electrical Co., Ltd., and W. H. Hayward. "Switch fuses." 17333. 8th June, 1946. (613482.)

English Electric Co., Ltd., G. H. Allwood, R. D. Ball, J. E. Cross and C. G. A. Woodford.—"Aircraft actuators." 17550. 12th June, 1946. (613233.)

Landis & Gyr Soc. Anon.—"Control equipment for motor-actuated electric switches." 17567. 22nd June, 1945. (613234. "Arrangement for connecting interior parts of electricity meters together and with a support inside the casing." 17568. 21st June, 1945. (613235.) "Escapement mechanism." 17569. 21st June, 1945. (613236.)

W. W. Constantine (General Motors Corporation.—"Overload control device for electric motors." 17575. 12th June, 1946. (613237.)

Standard Telephones & Cables, Ltd., and C. G. Treadwell.—"Arrangements for demodulating time-phase modulated electric pulses." 17606. 12th June, 1946. (613240.)

Hazeltine Corporation. — "Impedance - matching arrangement." 17612. 19th June, 1945. (613241.)

Monarch Machine Tool Co.—"Speed-control for electric motors." 17652. 23rd January, 1946. (613483.)

A. J. Campbell.—"Joint for conducting electric current." 17681. 13th June, 1946. (613246.)

British Thomson-Houston Co., Ltd.—"Embedding of electric conductors in magnesium oxide." 17693. 19th January, 1944. (613248.)

Copeland & Jenkins, Ltd., and J. A. Smyth.—"Elec-

trical resistance heating elements." 17703. 13th June, 1946. (613249.)

J. E. Shay, Ltd., and A. E. R. Arnot.—"Electrical cooking and like appliances." 17776 13th July, 1946. (613484.)

British Celanese, Ltd.—"Production of artificial filaments." 17778. 18th June, 1945. (613164.)

Westinghouse Brake & Signal Co., Ltd.—"Alternating-electric current rectifiers." 17876. 11th July, 1945. (613485.)

Miller-Hepworth, Ltd., and R. H. Church.—"Shades or reflectors for tubular fluorescent electric lighting." 17895. 14th June, 1946. (613177.)

Aircraft Radio Corporation.—"Manually adjustable knobs particularly for radio tuning mechanisms." 17921. 4th January, 1946. (613268.)

A. Middleton.—"Electrode holders." 17930. 14th June, 1946. (Cognate application 27393/46.) (613183.)

Electrical Steam & Mining Equipment (London), Ltd., and E. F. D. Webb.—"Mercury displacement switches." 17931. 14th June, 1946. (613270.)

Akt.-Ges. für Technische Studien.—"Thermal power plant." 17950. 22nd June, 1945. (613187.)

Farnsworth Television & Radio Corporation.—"Image dissector." 17962. 9th July, 1945. (613189.)

British Thomson-Houston Co., Ltd.—"Electric motor control system comprising electronic apparatus." 17968. 16th June, 1945. (Addition to 613049.) (613191.)

British Thomson-Houston Co., Ltd.—"Apparatus for the production of variable-frequency alternating voltages." 17970. 18th June, 1945. (613273.)

General Electric Co., Ltd., and A. G. Bowd.—"Electric light fittings." 17974. 14th June, 1946. (613193.)

Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—"Devices for vibration testing." 18034. 11th April, 1942. (613198.)

Fearnought, Ltd., and F. J. Harmour.—"Push-button bell." 18069. 15th June, 1946. (613202.)

C. H. Parsons, Ltd., and G. B. Handley.—"Fuse-holders or carriers. 18078. 15th June, 1946. (613203.)

British Insulated Callender's Cables, Ltd., G. M. Hamilton and A. Latin.—"Press suitable for the extrusion of lead." 18079. 15th June, 1946. (613204.)

Acoustic Products, Ltd., and T. F. Hassan.—"Loud-speakers." 18165. 17th June, 1946. (613287.)

A. Lysholm.—"Gas-turbine power plants." 18180. 22nd June, 1945. (613292.)

Landis & Gyr Soc. Anon.—"Protective device for electric condenser batteries." 18185. 26th June, 1945. (613293.)

Linde Air Products Co.—"Blanketed electric welding." 18195. 30th June, 1945. (613295.)

Donovan Electrical Co., Ltd., and H. Bosworth.—"Electric switch and fuse contacts." 18204. 18th June, 1946. (613297.)

W. C. M. Couch, J. T. Crennell, A. G. Milligan, H. Waterhouse and H. D. Maclaren.—"Electric accumulators." 18259. 18th June, 1946. (613308.)

Anti-Attrition Metal Co., Ltd., and R. Livingstone.—"Overhead line fittings for electric supply systems." 18264. 18th June, 1946. (613309.)

R. R. Bergmann.—"Electric light fittings." 18292. 18th June, 1946. (613314.)

Morris Motors, Ltd., J. H. Bridle and R. J. Brown.—"High-frequency induction heating apparatus." 18340. 19th June, 1946. (613322.) "High-frequency induction heating apparatus." 18341. 19th June, 1946. (613323.)

Linde Air Products Co.—"Electric welding torch and method of welding." 18354. 13th July, 1945. (613325.) "Gas-shielded electric arc-welding." 18355. 26th July, 1945. (613326.)

Pye, Ltd., and D. Jackson.—"Electric connectors." 18374. 19th June, 1946. (613327.)

H. E. R. Thomas.—"Time consuming or delay-action mechanism." 18378. 19th June, 1946. (613328.)

Soc. Savoisienne de Constructions Electriques.—"Arrangement of an expansion reservoir for tanks with dry joints." 18379. 23rd August, 1945. (613329.)

General Electric Co., Ltd., and P. Rabone.—"Concentrating tables." 18428. 19th June, 1946. (613375.) "Concentrating iron ore." 18429. 19th June, 1946. (613376.)

British Thomson-Houston Co., Ltd., and H. de B. Knight.—"Hermetically-sealed spark gaps." 18482. 19th June, 1946. (613383.)

G. W. Hibberd.—"Electro-mechanical power control and transmission systems." 18489. 19th June, 1946. (613384.)

E. Hallowell.—"Gas-turbine plants." 18517. 20th June, 1946. (613392.)

V. Mayer.—"Electric cut-outs particularly for the protection of motors against faults or overload." 18531. 20th June, 1946. (613396.)

Marconi's Wireless Telegraph Co., Ltd., and H. J. H. Wassell.—"Telegraph keys." 18626. 20th June, 1946. (613333.)

G. H. Wilkinson.—"Manufacture of electric resistance elements." 18653. 21st June, 1946. (613335.)

A. W. Priest and W. G. Barrett.—"Switch for the ignition systems of road vehicles and for like purposes." 18656. 21st June, 1946. (613336.)

Graviner Manufacturing Co., Ltd., and A. Mathisen.—"Aircraft provided with automatic electric switches." 18680. 21st June, 1946. (613343.)

Compagnie Générale d'Electricité.—"Unspillable electric accumulators." 18683. 24th September, 1945. (613344.)

British Thomson-Houston Co., Ltd.—"Electric capacitors." 18696. 25th June, 1945. (613345.)

Sulzer Frères Soc. Anon.—"Electrode boilers." 18708. 26th June, 1945. (Cognate application 18709/46.) (613349.)

Standard Telephones & Cables, Ltd., and C. E. Fadon-Clarke.—"High-frequency heating equipment." 18735. 21st June, 1946. (613354.)

J. Howden & Co., Ltd., and H. Baenninger.—"Centrifugal separators." 18815. 22nd June, 1946. (613363.)

J. Lucas, Ltd., and H. H. Foxall.—"Means for attaching switch or like knobs to spindles." 18839. 24th June, 1946. (613365.)

Standard Telephones & Cables. Ltd., and K. M. Burtt.—"High-frequency heating equipment." 18854. 24th June, 1946. (613368.)

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N. V. van der Heem.—"Method of assembling small electrical machines such as suction cleaning motors." 5884. 31st July, 1946. (Addition to 500417.) (613496.)

J. Compton Organ Co., Ltd., and L. E. A. Bourn.—"Electrical musical instruments." 3414. 22nd November, 1945. (613498.)

Amended Specifications

A. D. Blumlein.—"Electrical bridge arrangements." 581164.

Marconi's Wireless Telegraph Co., Ltd.—"Systems for directing radio waves." 598977.

Trade Marks

RECENT applications for the registration of trade marks include the following, objections against which may be entered within a month from 8th December:—

Design (girl with word "Bylock" on hat). No. 662,295. Class 7. Domestic mixing machines and electric hedge cutters.—Bylock Electric, Ltd., 109, South Street, Ponders End, Middx.

SYNCHROMO. No. 651,085. Class 9. Electric remote control apparatus and correspondence control apparatus; and electric transmitting and receiving apparatus and speed-controlling apparatus, all for use with electric remote control and correspondence control apparatus.—B. & P. Swift, Ltd., Swift Works, North Circular Road, London, N.W.10.

MASTERADIO. No. B652,888. Class 9. Domestic and car-radio receiving sets.—Masteradio, Ltd., Fitzroy Place, London, N.W.1.

DURALIFE. No. 662,203. Class 9. Electric batteries and accumulators (not for medical purposes). — Duralife Batteries, Ltd., Gatley, Cheadle, Ches.

COLUMBINE. No. 664,916. Class 9. Electric flatirons.—C.V.A. Jigs, Moulds & Tools, Ltd., 329, Portland Road, Hove, 3.

CONTRACT INFORMATION

ACCEPTED TENDERS AND PROSPECTIVE ELECTRICAL WORK

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Argentina.—BUENOS AIRES.—18th January. Directorate-General of Water Power and Electrical Power. Switchboards and transformers for Mar del Plata. (E.P.D. 43901/48. Ten/27.)*

Belfast.—7th January. Electricity Department. Stores, including electrical apparatus and material. (10th December.)

Darlington.—24th December. Corporation. Electrical installation at the Alderman Leach Primary School. (10th December.)

Derby.—31st December. Omnibus Committee. V.h.f., f.m. radio equipment. (See this issue.)

Egypt.—CAIRO.—18th January. Egyptian Ministry of Public Works. Diesel generating station, three electric pumping stations and 33-kV transmission line. (E.P.D. 44059/48. Ten/30.)*

The time for the receipt of tenders for the erection of the 25,000-kW power station at Talkha has been extended to 15th January, 1949. (E.P.D. 32587/48. Com/1013A.)*

Halifax.—4th January. Borough Council. Installation of two electrically driven centrifugal pumps, with switchgear, metering equipment, etc., at Thrum Hall pumping station. Waterworks engineer, Gibbet Hill (deposit: £2 2s).

New Zealand.—WELLINGTON.—21st January. Post and Telegraph Department. Insulated switchboard wire and cable. (E.P.D. 44010/48. Ten/41.)* 15th March. State Hydro-Electric Department. 50-kV switchgear and steelwork. (E.P.D. 44131/48. Ten/38.)*

State Hydro-Electric Department. 8th March. 110-kV switchgear and steelwork. (E.P.D. 44130/48. Ten/37.) 15th March. Substation control boards. (E.P.D. 44132/48. Ten/39.)*

Pakistan.—KARACHI.—3rd January. Department of Supply and Development. Four 5,000-kW hydro-electric generating units for the Dargai hydro-electric power station. (E.P.D. 41985/48) Ten/35.)*

Romford.—17th January. Corporation. Electrical installation in 120 two-storey flats. (See this issue.)

South Africa.—CAPETOWN.—26th January. Electricity Department. 17,600 yd 12-kV armoured cable; 25,000 yd 600-V armoured cable; and 15,000 yd armoured 10-pair telephone cable. (E.P.D. 44036/48. Ten/31.)*

DURBAN.—4th March. Municipal Electricity Department. 33-kV and 11-kV switches. (E.P.D. 44047/48. Ten/50.)*

Southampton.—1st February. Town Council. Electrically driven pumping plant, with standby. J. Hawksley, waterworks engineer, Civic Centre (deposit: £5).

Sunderland.—23rd December. Borough Council. Electrical installations in 328 houses, Pennywell and Thorney Close estates. Borough engineer, Athenæum Buildings, Fawcett Street.

Uruguay. — MONTEVIDEO. — 19th January. Electricas Telefonos del Estado. Four 600-kW and five 300-kW generators, with option of six in both cases. (E.P.D. 43989/48. Ten/28.)*

Orders Placed

Boldon (Durham).—U.D.C. Accepted. Electrical installations in three army camps now used for housing purposes (£221).—W. T. Purvis, Whitburn.

Doncaster.—Corporation. Recommended. Electrical installations in 44 houses on the Wheatley Park estate (£1,316).—F. Sinclair.

Douglas (I.O.M.)—Corporation. Accepted. Extension of switchgear at Pulrose power station (£7,705).—Switchgear & Cowans.

Durham.—County Education Committee. Accepted. Installation of electric lighting at the Hebburn New Town County School (£1,304). —Neale & Partners.

Gateshead.—Town Council. Accepted. Laying electric cables in Sunderland Road (£1,841). —British Insulated Callender's Cables.

Education Committee. Accepted. Electrical installations in the kitchen/dining rooms at the King Edward School (£524) and Shipcote School (£520).—G. F. Ellis & Co., Low Fell.

Glasgow.—Corporation. Accepted. Replacement of electrical switchgear at Kelvin Hall (£1,545).—M. & C. Switchgear, Ltd.

London.—L.C.C. Accepted. Electrical installation at Crawford School, Camberwell.—Iverson Electrical, Ltd.

Newcastle-on-Tyne.—City Council. Accepted. Electrical installations in 64 houses on the Dewley Road housing estate (£3,798).—T. Mitchelson (Electrical), Ltd., Gateshead.

Four electric cranes for quayside (£35,480).—Cowans, Sheldon & Co.

Northampton.—Corporation. Recommended. Electric wiring in 34 houses on the Dallington Fields estate (£841).—Electrical Installation Co.

Sunderland.—Education Committee. Accepted. Electrical installation at the new Valley Road Primary School (£2,017).—North of England Engineering and Electrical Co., Ferryhill.

Worcester.—Civic Restaurants Committee. Recommended. Electric fish fryer (£116).—Jackson Electric Stove Co.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Bedale.—Houses (20); R.D.C. surveyor.

Bognor Regis.—Reconstruction of Pavilion (£76,100); U.D.C. surveyor.

Bridge-Blean.—Houses (90), Hersden, for R.D.C.; R. Miles, building surveyor, Council Offices, Old Dover Road, Canterbury.

Burton-on-Trent.—Secondary school, Hillside; borough engineer.

* Specifications may be inspected at the Export Promotion Department, Thames House North, Millbank, S.W.1.

Chesterton (Staffs).—Workshops for G. H. Downing & Co., Ltd., Audley Road; Wood, Goldstraw & Yorath, architects, Victoria Road, Tunstall.

Colchester.—Houses (45), Shrub End; J. S. Orchard, borough surveyor, Town Hall.

Dagenham.—Flats (148) and houses (131), Heathway Park estate, for T.C.; Norman & Dawbarn, architects, 5, Gower Street, W.C.1.

Durham.—Shops, Sunderland Road housing estate; city engineer.

East Sussex.—Secondary school, Uckfield (first section); E. A. Verger, county architect, Lewes.

Eastbourne.—Houses (41), Northbourne Road and Bowood Avenue; Chatsworth Estates, Compton Estate Office.

Eastry (Kent).—Houses (96); surveyor, Rural Council Offices, Sandwich.

Gateshead.—Kitchen/dining room at Whitehall Road; H. D. Harding, Ltd., builders, Dunston-on-Tyne.

Glasgow.—Reconstruction of Kingston Halls after fire (£25,000); city architect.

Tenements, James Gray Street; A. McGregor Mitchell, architect, 50, Berkeley Street.

Works, Pinkston Road; Oswald Tofollo & Co., Ltd., 182, West Regent Street.

Grangemouth.—Extension of refinery (£7,500,000); manager, Scottish Oils, Ltd., 53, Bothwell Street, Glasgow. C.2.

Greenock.—Church for Greenock Presbytery; Rev. J. H. A. Inglis, Convener, Home Mission Committee, Greenock.

Herne Bay.—Houses (40), Sea Street estate, for U.D.C.; engineer and surveyor.

Hertfordshire.—Junior, mixed and infants' school, Cowley Hill, Boreham Wood (£62,000); county architect, Hertford.

Holditch.—New factory; Tilsley & Lovatt, Ltd., Kensington Road, Oakhill, Stoke-on-Trent.

Jarrow (Co. Durham).—Three blocks of five-storey flats, Albion Street area; H. Perkins, borough surveyor, Town Hall.

Kent.—Secondary school, Hurst Road, Sidcup; Kent & Sussex Contractors, Ltd., 109, Station Road.

Kirkcaldy (Fife).—Church hall at Hayfield (£13,000); clerk of the Presbytery, Kirkcaldy.

Liverpool.—Infants' school, Speke, for R.C. authorities; J. C. Prestwich & Son, architects, Bradshawgate Chambers, Leigh, Lancs.

London.—12-storey block of offices, Farringdon Street, Shoe Lane, and Charterhouse Street area; Sir Thomas Bennett & Son, architects, 43, Bloomsbury Square, W.C.1.

Maghull.—British Legion hall, etc. (£12,000); R. R. Bradley, architect, 5, Damfield Lane.

Milford Haven.—Housing estate, Steyton Road; C. H. J. Talmage, engineer, 15/21, Southchurch Road, Southend-on-Sea.

Newcastle-on-Tyne.—Shed on quayside for the City Council (£13,425); Wright, Anderson & Co., Ltd., builders, Gateshead.

Newport (Mon).—Transport depot, Dock Street; R. Keetch & Sons, Ltd., Wells Road, Nottingham.

Norham (Northumberland).—Houses (30); R.D.C. surveyor.

Norman Cross.—Houses (24) for R.D.C.; Ruddle & Wilkinson, architects, Long Causeway Chambers, Peterborough.

North Riding.—Police station at Brotton for the C.C.; county architect, County Hall, Northallerton.

Nottingham. — Two schools, Bilborough (£111,343); J. W. Stamp & Co., builders, Bobber's Mill, Nottingham.

Houses (450), Bilborough site; city housing architect.

Peterborough.—Extensions to works; British Braids, Ltd., Regal Works, Burton Street.

Houses (92), Dogthorpe/Newark estate; borough engineer.

Plymouth.—Factory, Manor Gardens; Winnicott & Co., Ltd., Rendle Street.

Shildon.—Houses (1,000) to be erected over ten years at West Thickley; U.D.C. surveyor.

Smethwick.—Omnibus station, Lightwoods Park site; borough engineer.

Southampton.—School, Diamond Avenue (£80,000); L. Berger, architect, Civic Centre.

Stoke-on-Trent.—Electrical and engineering workshops, Audley Road, Chesterton, for G. H. Downing & Co., Phillips Bros., builders, Silverdale, Stoke-on-Trent.

Sunderland.—Canteen and factory additions, Pallion trading estate; S. W. Milburn & Partners, architects, 9, The Esplanade.

Swansea.—Additions to arts department at Swansea University (£32,152); Bennett Bros. (Contractors), Ltd., Heatherfield, Carlton Terrace.

Wallsend.—Houses (200) during 1949; borough engineer.

West Hartlepool.—Assembly halls, dining rooms and kitchen at the Seaton Lane County Primary School; S. M. Richmond, borough architect, Municipal Buildings.

West Sussex.—Children's home, Littlegreen, Compton (£25,230), and junior school, East Preston (£47,790); county architect, Chichester.

Wood Green.—Flats (56), Vincent Road; borough engineer, Town Hall, N.22.

Worcestershire.—Primary school, Cofton Common, Bromsgrove; F. Gibberd, architect, 35, Gordon Square, W.C.1.

Next Week's Events

Monday, 20th December

BIRMINGHAM.—Imperial Hotel, 6 p.m. I.E.E. South Midland Supply and Utilization Group. "Behaviour of High-Voltage Solid-Type Cable Accessories in Service," by C. J. Armstrong and C. T. W. Sutton.

CARDIFF.—Royal Hotel, 6.30 for 7 p.m. I.E.E. Western Utilization Group. Annual dinner.

NEWCASTLE-ON-TYNE. — King's College, 6.15 p.m. I.E.E. North-Eastern Radio and Measurements Group. "Three-Dimensional Cathode-Ray Tube Displays," by E. Parker and P. R. Wallis.

Tuesday, 21st December

GLASGOW.—Royal Technical College, 7 p.m. I.E.E. Scottish Centre. "The Design of Contactors with regard to their Industrial Application," by B. Feldbauer.

Lighting Service Bureau, 2, Savoy Hill, W.C.2, 6.15 p.m. Association of Supervising Electrical Engineers. "Recent Advances in Television," by D. Weighton.